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ABSTRACT

This volume is the last of five volumes describing a systematic approach for constructing task inventories, surveying the task performance of occupations, and analyzing survey data to determine the appropriate performance content for job training. (The approach, referred to as the task survey process, is designed to be of value to both occupational curriculum personnel and those persons concerned with noncurriculum issues of occupational description and updating of job content information.) This volume includes two sections. Section 1 describes a computer program that can be used to process occupational survey data. The second section summarizes the results of analyses that entered into the determination of the task selection process of volume 4 (CE 013 196), covering performance requirements for training. This section is included to explain how and why the selection procedures of volume 4 were determined. (SH)

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Research and Development Series No. 125

PERFORMANCE CONTENT FOR JOB TRAINING

VOLUME 5

PROCESSING SURVEY DATA: TECHNICAL APPENDICES

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U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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THE CENTER MISSION STATEMENT

The Center for Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The Center fulfills its mission by:

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

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FOREWORD TO VOLUME 5

The Center for Vocational Education is continuing programmatic research to develop more effective procedures for identifying valid and necessary curriculum content. One product of this effort is the five-volume description of procedures for constructing task inventories, surveying the task performance of occupations, and analyzing survey data to aid curriculum planners and developers in determining the appropriate performance content for job training. The procedures are intended to be of value to both occupational curriculum personnel and those persons concerned with non-curriculum issues of occupational description and updating of job content information.

This set of procedures revises and considerably expands upon an earlier version of task inventory and survey procedures in The Center's report authored by William Melching and Sidney Borcher, R&D Series No. 91, *Procedures for constructing and using task inventories*, March 1973. The initial procedures profited greatly and drew heavily from the report by Joseph Morsh and Wayne Archer at the USAF Personnel Research Laboratory, *Procedural guide for conducting occupational surveys in the United States Air Force*. Center development of the inventory and survey process has concentrated on their adaptation to purposes of helping in the derivation of curriculum content. This adaptation has included greater concern for how a task is stated, what task information should be obtained, and how to use this task information in selecting the more relevant and critical content that warrants consideration as a learning objective.

The total set of volumes in this series consists of the following titles:

Volume 1: Introduction.

Volume 2: Stating the tasks of the job.

Volume 3: Identifying relevant job performance.

Volume 4: Deriving performance requirements for training.

Volume 5: Processing survey data: Technical appendices.

The focus upon the performance content of specific occupations is parallel to The Center's concern for the *conceptual* and *affective* content of training, as published in earlier reports, R&D Series No. 98 and 105. Results of several research applications of portions of the process as it was being developed are published as R&D Series No. 86, 87, 88, 108, 109, and 110. Currently underway is an exploratory study of more generally applicable skills that may be used in different occupational areas as well as within a particular occupation. Such occupationally transferable skills or competencies would seem to be useful complements to the present concern for job specific content.

Volume 5, Processing Survey Data: Technical Appendices, describes a computer program that can be used to process occupational survey data. It also summarizes the results of analyses that entered into the determination of the task selection process of Volume 4.

The procedures benefit from a variety of reported research studies and experiences of many persons over the last several years, notably that work sponsored by the USAF Personnel Research Laboratory. There also has been extensive input from the many vocational educators, curriculum developers, occupational instructors, employers, job supervisors, and workers themselves who have been involved in various aspects of trying out different portions of the process reported here.

Continued improvement can be anticipated as wider experience is gained in the implementation of task inventories and occupational surveys. It is hoped the present procedural descriptions may be of immediate use and value in aiding and promoting such implementation. By such means there should be increasing assurance that curriculums and instructional materials provide for those things most appropriately learned in a training program, and that students will be learning skills which are important to and required for effective job performance.

Frank Pratzner was director of the R&D program in which the five volumes of this set were developed. The work of which this volume is a part was sponsored by the Education and Work Group of the National Institute of Education, with Robert Stump serving as Project Officer.

Robert E. Taylor
Executive Director
Center for Vocational Education

THE INTENTION OF THESE TECHNICAL APPENDICES

These Technical Appendices are not essential to the use of the task survey process that is described in the other volumes. They do provide, however, some possibly helpful elaboration of how the survey data can be processed, as well as some substantiation of the process by which those data are used to identify job performance content for training.

Appendix A, Task Inventory System (TIS) Program, is written for the benefit of the computer programmer who assists with the data processing effort. Various programmers may have alternative ways of handling the data, which can be quite acceptable. They will need to structure the coding and processing of data to fit the special needs of the occupational survey and of the computer system with which they are working. It is intended that the description here of one data processing system may make that programming effort easier to accomplish.

Appendix B, Summaries of Analyses Used to Establish the Task Selection Variables, is included for those persons who wish to understand how and why the selection procedures of Volume 4 were determined. It is written for the researcher and the research statistician, to indicate what kinds of efforts were made to establish the statistical reliability and validity of the selection procedure.

TECHNICAL APPENDIX A
TASK INVENTORY SYSTEM
(TIS) PROGRAMS

OVERVIEW

In the preceding volumes, methods for collecting and analyzing task survey data have been described. In these procedures, tasks in a single list may be rated on a combination of several different "questions" (e.g., importance, frequency of performance) by supervisors and/or workers in a particular occupational area.

As was pointed out in those volumes, numerous computer programs and statistical packages are available which are capable of producing summary statistics on these data. Such program packages as SOUPAC, SPSS, BMD, and OMNITAB are widely distributed. For the research and development effort culminating in these reports, however, it was desirable to devise a new "system" of programs to summarize the task data collected. These programs were intended to (a) organize on varying combinations of "questions," regardless of sampling scheme employed; (b) automatically calculate whatever summary statistics are appropriate to the response format for each question (i.e., frequency distributions, percentages, means, modes, medians, and measures of dispersion); and (c) produce clearly labelled, compact tables in "publishable" form. These programs are being made available to the general user, who may not have existing statistical packages readily available, or who may desire some of the application-specific advantages offered by the routines.

It should be noted at the outset that the programs were written in FORTRAN specifically for efficient use on the IBM 370 OS system at The Ohio State University and *may* require some change for use at other installations. Some possible areas for attention are:

1. Programs use the END= parameter in READ statements (an IBM extension to the FORTRAN IV language).

2. One program, as presently dimensioned, requires a region size of 350K.

3. Logical units 6, and 11-21 are *all* used as print output datasets in one program.

Possible methods to circumvent these constraints will be discussed in sections dealing with individual program descriptions.

THE TASK INVENTORY SYSTEM (TIS)

The TIS programs will analyze data collected on *any* or *all* of 13 questions about each of (up to) 500 task items.

The 13 questions involve:

1. Actual Task Occurrence (Worker rating)
2. Desired Task Occurrence (Supervisor rating)
3. Extent Task Is Part of Position (Worker rating)
4. Extent Task Is Part of Job (Supervisor rating)
5. Time Spent[1] (Worker rating)
6. Learning Location (Worker rating)
7. Learning Location (Supervisor rating)
8. Time to Qualify (Supervisor rating)
9. Possibility of Improving Procedures (Supervisor rating)
10. Frequency of Performance (Worker rating)
11. Frequency of Performance (Supervisor rating)
12. Task Importance to Job (Worker rating)
13. Task Importance to Job (Supervisor rating)

Data being input to the system *must* conform to specified legal codes associated with each question. The previous volumes of this series describe item-response formats to be used. The previous volumes of this series describe item-response formats to be used. Questions 1-4 are discussed in Volume 3, Question 5 is not used at this time, Questions 6 and 7 are presented in Volume 4, and Questions 8-13 are briefly identified in the Appendices to Volumes 3 and 4. Response alternatives for each question, as presented in those volumes, and their associated numerical codes are shown below.

Valid Response Codes for Each Question

Question 1: Actual Task Occurrence (Workers)

1 = checked (positive)
2 = not checked (negative)

---

[1] Not included in present version of the program. Analyses of Time Spent ratings may be done using the CODAP programs, as referenced in Volume 3.

Question 2: Desired Task Occurrence (Supervisors)

1 =	checked (positive)
2 =	not checked (negative)

Question 3: Extent Task Is Part of Position (Workers)

0 =	0:	not part of position
1 =	1:	*minor* part
2 =	2	(intermediate points)
3 =	3	
4 =	4:	a *substantial* part
5 =	5	(intermediate points)
6 =	6	
7 =	7:	a *most significant* part

Question 4: Extent Task Is Part of Job (Supervisors)

Same codes as Question 3.

Question 5: Time Spent

Not used at this time.

Question 6: Learning Location (Workers)

1 =	P:	PRIOR to training program
2 =	T:	in a formal TRAINING program
3 =	S:	on SITE, after employment
4 =	E:	related employment EXPERIENCE
5 =	O:	OTHER
6 =	N:	there is NOTHING to learn

Question 7: Learning Location (Supervisors)

Same codes as Question 6.

Question 8: Time to Qualify (Supervisors)

1 =	O:	competency never necessary
2 =	Y+:	beyond 3 years
3 =	3Y:	within the first 3 years
4 =	Y:	within the first year
5 =	6M:	within the first 6 months
6 =	3M:	within the first 3 months
7 =	M:	within the first month
8 =	W:	within the first week

Question 9: Possibility of Improving Procedures (Supervisors)

1 =	H:	provide a HANDBOOK or guide	use when "Yes" is checked AND a method is cited
2 =	D:	clarify existing DIRECTIVES	
3 =	T:	improve TRAINING content	
4 =	R:	provide RESEARCH or study	
5 =	?:	don't know how	
6 =	O:	OTHER	
7 =	Yes checked, method unusable		
8 =	Yes checked, method not cited		
9 =	Yes *not* checked (or missing data)		

Question 10: Frequency of Performance (Workers)

1 =	O+:	never performed, but might
2 =	Y–:	much less often than once per year
3 =	1Y:	one or more times per year
4 =	1M:	one or more times per month
5 =	1W:	one or more times per week
6 =	1D:	once per day, on the average
7 =	D+:	several times each day

Question 11: Frequency of Performance (Supervisors)

Same codes as Question 10.

Question 12: Task Importance to Job (Workers)

1 =	low importance
2 =	medium importance
3 =	high importance

Question 13: Task Importance to Job (Supervisors)

Same codes as Question 12.

Numerical codes not listed above will not be counted in the calculation of task summary statistics, and may be used as missing data codes. It should be noted, however, that "0" (zero) is a valid code for Questions 3 and 4. Consequently, blanks and zeros should *not* be used as missing data codes for those questions. A code of "9" may be used as a missing data code consistently on all questions.

Data will be in the following form. Each questionnaire will relate to only *one* of the 13 questions. The respondent will rate each of the tasks listed according to that question. A single respondent may rate the tasks on more than one question by completing several of the 13 questionnaires. It is *not* necessary for the same number of people to complete each questionnaire. Each subject's data for a particular question should be keypunched, including an ID number (unique to each respondent), question number (1 to 13), a sequential card number, and task ratings, in that order. The card format is variable, with the restrictions that:

1. The ID number may use a maximum of 12 columns and is the first (leftmost) field on the card (I format).

2. The question number is in the range of 1-13 and is the second field on the card (I-format).

3. The card number is the third field on the card. Card numbers may optionally start the sequence at the beginning of each subject's responses for each question, or run continuously through all questions for one subject (I-format).

4. Task data follows in I1 format.

As many cards as necessary are used to accommodate ratings on all tasks for one subject, but each card must contain the same ID and question number and must be numbered sequentially in the card number field. There may be unused columns in the task data fields of a subject's last card for a particular question (i.e., the total number of tasks is not evenly divisible by the number of tasks per card). These unused columns should be left blank. Data cards *must* be in the same format for all questions.

The Task Inventory System itself consists of four programs:

1. *FILEUP,* which reads raw data cards, scans for inconsistencies (described in the program description), checks for card sequencing errors, and builds a raw data tape file (MASTER).

2. *SVCALC,* which reads the MASTER file; calculates summary values for each task on each question and creates a summary value tape file (SVFILE).

3. *TABLES,* which reads the SVFILE and prints desired Data Summary Tables.

4. *LEVEL,* which selects "relevant" tasks, and, if desired, calculates for each task a linear combination of summary values (predicted levels of development).

FILEUP

The number of tasks and format of data to be read by FILEUP are specified by means of a parameter card and a format card. The deck set-up is:

1. System Control Cards.

2. FILEUP Source deck.

3. Parameter Card:

col 1-3	Number of tasks ($2 \leq N \leq 500$).
col 4	blank
col 5	Method of card numbering:

1 = Sequence starts over each question
2 = Sequence continuous over all questions for one subject

col 6	blank

col	7	Bypass card sequence check? 0 = No 1 = Yes
col	8	blank
col	9	Does another dataset follow this one? 0 = No 1 = Yes
col	11-12	Number of task responses *per card.*
col	13-52	Title (alphanumeric and centered).
col	53-54	Logical unit for data input (if no 5).

4. Format Card:

Format, enclosed in parentheses, using up to 80 columns. The format describes the four data fields listed above, for *one card only,* in *I-format.* That is, all data cards contain ID, question number, card number, and task data, in that order. The format for all cards is the same, even though the last card for one subject on one question may not use all the columns allocated for task data. For example, a survey consists of 200 task items.

> The ID is 10 columns, question number and card number are 2 and 1 columns, respectively, and 60 tasks are punched per card. There would be 60 tasks punched on the first three cards, for one subject on one question, and 20 on the fourth. Columns 11-12 on the parameter card would contain "60," and the format might be (I10, I2, I1, 60I1).

5. Data:

Data must be *pre-sorted* so that all data on all questions answered by one subject are together. Data may be from cards or tape. If data reside on a logical unit other than 5, punch unit number in columns 53-54 of the parameter card.

The program combines data from however many questionnaires are present from one respondent into a single output record, along with ID, and 13 dichotomous variables which indicate whether or not data from their respective questionnaires are present for that subject.

Data are also edited for inconsistencies. That is, raters who receive Questions 1 or 2 are asked to rate whether tasks are (or should be) performed on the job. Raters who do not check a task as performed on Questions 1 or 2 are instructed not to rate that task on other questions, to avoid bias in the data. If a task not checked on Question 1 or 2 is rated on other questions, the ratings on those questions, for that task only, are replaced by a missing data code of "9" and a message is printed. Obviously, no check can be made if Question 1 or 2 data are not present for a given respondent.

If too many or too few cards exist for any question which is present for any subject, or if cards are out of sequence, the program will print an appropriate error message, and that subject will *not* be included on the master file. This does *not* imply that all subjects must have the same number of cards. For example subject number 1 may have completed Questions 1 and 6, while subject 2 completed Question 3 only. If three cards are required per question, subject number 1

would have six cards, and subject number 2 would have three. In other words, *if* a respondent has *any* data present for a particular question, that respondent must have *all* data present for that question, with cards properly identified by ID, question number, and card sequence.

More than one dataset (max. 9) may be put on the same master file (as a different problem) by coding a "1" in column 9 of the parameter card of all datasets except the last. Each dataset will ultimately produce a separate set of tables in the TABLES program and a separate report from LEVEL. (Numbers of tasks need not be equal across datasets.) On the Ohio State IBM 370 OS system, this is accomplished by labelling input datasets FT05F001, FT05F002, etc., and using the END= parameter in READ statement number 60. For installations without these features, the same thing could be accomplished by using an out-of-range ID number as an end-of-dataset marker, e.g., "99999." The user should then remove the END= parameter from the READ statement and add, immediately following statement number 60:

```
IF(ID.EQ.99999)GO TO 160.
```

For each dataset, output to the Master file tape consists of:

1. Header record:

   col 1-40 Title.
   col 41-43 Number of tasks.
   } from parameter card

2. 1 record for each subject encountered:

   col 1 Problem number (assigned by the program).
   col 2-13 ID.
   col 14-26 Indicators (see below).
   col 27-?? Task data (see below).

3. End of dataset record

   col 1 = 0 (zero).

On each record, beginning in column 27, there are 13 sections of task data, each containing one column for each task. The sections, numbered 1 to 13 from left to right correspond to the 13 questions in the following way:

Section	Question No.	Section	Question No.
1	1	8	12
2	2	9	13
3	10	10	9
4	11	11	4
5	5	12	6
6	3	13	7
7	8		

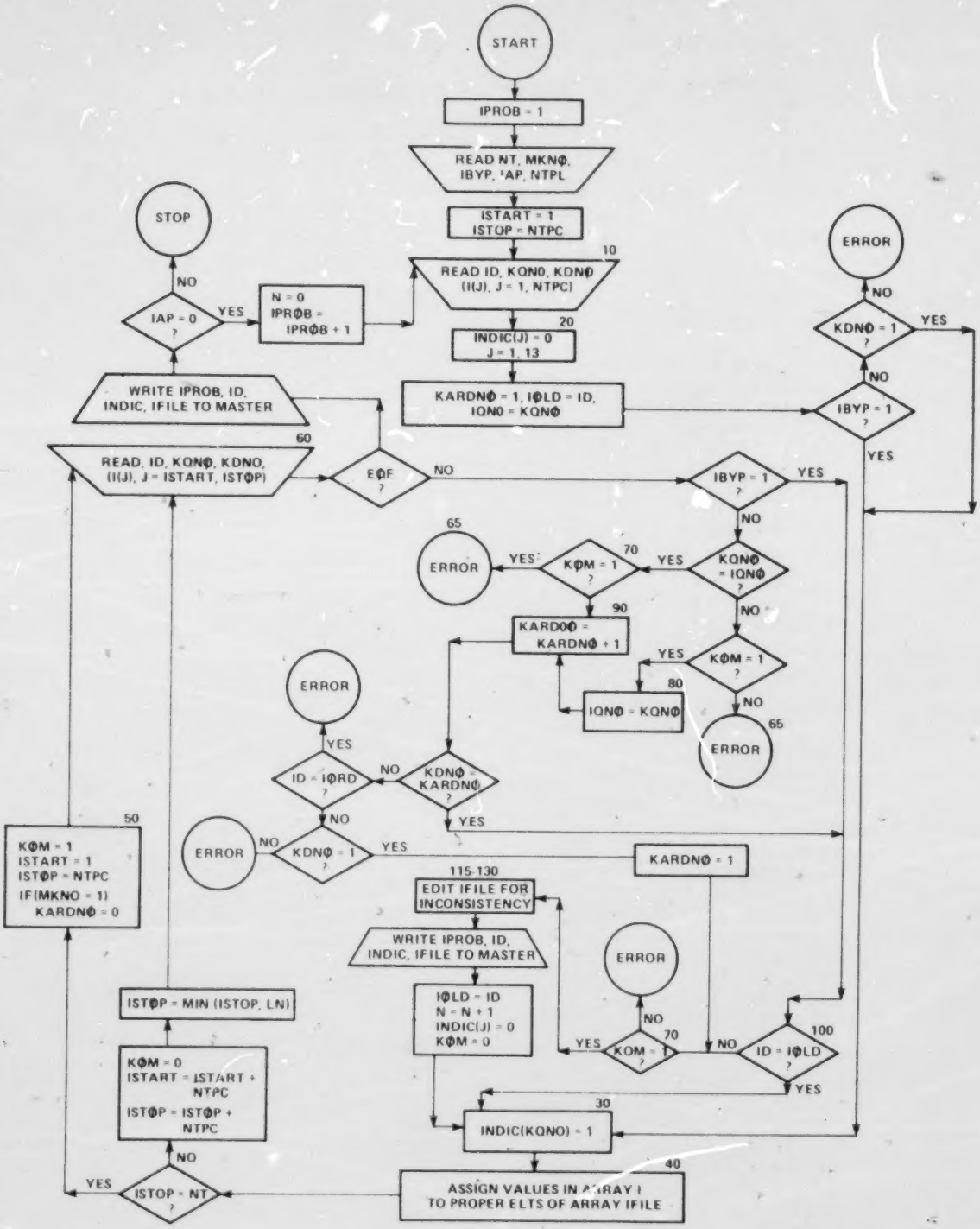
Thirteen "indicators" in columns 14-26 of the Master file record refer to the 13 data sections of the record. If data are present for the question associated with a particular section, the corresponding indicator is set to "1," and task data appear, in order, in that section. If data are not present, the

indicator is "0," and all columns in the data section are also "0." (In subsequent programs, data are only entered into calculations if the corresponding indicators are "1.")

The Master file is written to logical unit 1, with a logical record length of (13 x NT) + 26 (including the problem number, ID, indicators, and task data), where NT = number of tasks.

FILEUP should run in approximately 32K.

FILEUP


START
IPROB = 1
READ NT, MKNØ, IBYP, IAP, NTPL
ISTART = 1
ISTOP = NTPC
10
READ ID, KQN0, KDNØ (I(J), J = 1, NTPC)
20
INDIC(J) = 0
J = 1, 13
KARDNØ = 1, IØLD = ID, IQN0 = KQNØ
IBYP = 1 ?
YES
NO
KDNØ = 1 ?
YES
NO
ERROR
IBYP = 1 ?
YES
NO
KQNØ = IQNØ ?
YES
NO
70
KØM = 1 ?
YES
NO
65
ERROR
KØM = 1 ?
YES
NO
80
IQNØ = KQNØ
65
ERROR
90
KARDOØ = KARDNØ + 1
KDNØ = KARDNØ ?
YES
NO
ID = IØRD ?
YES
NO
ERROR
KDNØ = 1 ?
YES
NO
ERROR
KARDNØ = 1
115-130
EDIT IFILE FOR INCONSISTENCY
WRITE IPROB, ID, INDIC, IFILE TO MASTER
IØLD = ID
N = N + 1
INDIC(J) = 0
KØM = 0
KOM = 1 ?
YES
NO
70
ERROR
ID = IØLD ?
100
YES
NO
30
INDIC(KQNO) = 1
40
ASSIGN VALUES IN ARRAY I TO PROPER ELTS OF ARRAY IFILE
ISTOP = NT ?
YES
NO
KØM = 0
ISTART = ISTART + NTPC
ISTØP = ISTØP + NTPC
ISTØP = MIN (ISTOP, LN)
50
KØM = 1
ISTART = 1
ISTØP = NTPC
IF(MKNO = 1) KARDNØ = 0
EØF ?
NO
60
READ, ID, KQNØ, KDNO, (I(J), J = ISTART, ISTØP)
WRITE IPROB, ID, INDIC, IFILE TO MASTER
IAP = 0 ?
YES
NO
N = 0
IPRØB = IPRØB + 1
STOP

17

```
C     PROGRAM FILEUP

      DIMENSION I(500),TITLE(10),INDIC(13),IFILE(6500),FORM(20),
     *IOQU(13),INQU(13)
      DATA IOQU/1,2,6,11,5,7,12,13,10,3,4,8,9/,
     *     INQU/1,2,10,11,5,3,6,12,13,9,4,7,8/
      IEOF=0
      N=0
      IPROB=1
   10 READ(5,210)NT,MKNO,IBYP,IAP,NTPC,TITLE,ITAPE
      IF(ITAPE.EQ.0)ITAPE=5
      K=13*NT
      DO 15 J=1,K
   15 IFILE(J)=0
      WRITE(1,220)TITLE,NT
      ISTART=1
      ISTOP=NTPC
      READ(5,230)FORM
      READ(ITAPE,FORM)ID,KQNO,KDNO,(I(J),J=1,NTPC)
   18 DO 20 J=1,13
   20 INDIC(J)=0
      KARDNO=1
      IOLD=ID
      ICNO=KQNO
      IF(IBYP.EQ.1)GO TO 30
      IF(KDNO.EQ.1)GO TO 30
      WRITE(6,240)ID,IPROB
      GO TO 180
   30 IF(KQNO.GE.1.AND.KQNO.LE.13)GO TO 35
      WRITE(6,260)
      GO TO 180
   35 JLM=IOQU(KQNO)
      INDIC(JLM)=1
      K=(JLM-1)*NT
      DO 40 J=ISTART,ISTOP
      L=K+J
   40 IFILE(L)=I(J)
      IF(ISTOP.EQ.NT)GO TO 50
      KOM=0
      ISTART=ISTART+NTPC
      ISTOP=ISTOP+NTPC
      ISTOP=MINO(ISTOP,NT)
      GO TO 60
   50 KOM=1
      ISTART=1
      ISTOP=NTPC
      IF(MKNO.EQ.1)KARDNO=0
   60 READ(ITAPE,FORM,END=160)ID,KQNO,KDNO,(I(J),J=ISTART,ISTOP)
      IF(IBYP.EQ.1)GO TO 100
      IF(KQNO.EQ.ICNO)GO TO 70
      IF(KOM.EQ.1)GO TO 80
   65 WRITE(6,250)ID,ICNO,IPROB
      GO TO 180
   70 IF(KOM.EQ.1)GO TO 65
      GO TO 90
```

```
 20 IOLD=KOND
 25 KARDNO=KARDNO+1
    IF(KOND.EQ.KARDNO)GO TO 100
    IF(ID.EQ.IOLD)GO TO 25
    IF(KOND.NE.1)GO TO 25
    KARDNO=1
    GO TO 110
100 IF(ID.EQ.IOLD)GO TO 30
110 IF(KOM.NE.1)GO TO 65
115 IF(INDIC(1).EQ.0.AND.INDIC(2).EQ.0)GO TO 140
    DO 130 J=1,NT
    IF(IFILE(J).EQ.1.OR.IFILE(J+NT).EQ.1)GO TO 130
    DO 130 K=3,13
    IF(INDIC(K).NE.1)GO TO 130
    L=(K-1)*NT+J
    IF(IFILE(L).GT.0.AND.IFILE(L).NE.9)GO TO 120
    GO TO 130
120 WRITE(6,260)IOLD,J,INQU(K),IFILE(L)
    IFILE(L)=9
130 CONTINUE
140 K=NT*13
    WRITE(1,270)IPROB,IOLD,INDIC,(IFILE(J),J=1,K)
    DO 142 J=1,K
142 IFILE(J)=0
    N=N+1
    IF(IEOF.EQ.1)GO TO 150
    IOLD=ID
    DO 145 J=1,13
145 INDIC(J)=0
    KOM=0
    GO TO 30
150 WRITE(1,280)
155 WRITE(6,290)IPROB,N
    IF(IAP.NE.1)GO TO 170
    N=0
    IPROB=IPROB+1
    IEOF=0
    GO TO 10
160 IEOF=1
    GO TO 110
170 END FILE 1
    REWIND 1
    STOP
180 READ(ITAPE,FORM,END=190)ID,KOND,KOND,(I(J),J=1,NTPC)
    IF(KOND.NE.1)GO TO 180
    KXZZ=13*NT
    DO 185 J=1,KXZZ
185 IFILE(J)=0
    ISTART=1
    ISTOP=NTPC
    GO TO 18
190 GO TO 155
210 FORMAT(I2,1X,3(I1,1X),I2,10A4,I2)
220 FORMAT(10A4,I3)
230 FORMAT(20A4)
```

```
240 FORMAT(1H0,'*****ERROR IN CARD SEQUENCE.ON SUBJECT NO. ',I12,
   *' FOR PROBLEM NO. ',I2)
250 FORMAT(1H0,'*****ERROR. TOO MANY OR TOO FEW CARDS FOR SUBJECT NO.'
   *,I13,' ON QUESTION NO. ',I2,', PROBLEM NO. ',I2)
260 FORMAT(1H0,'**INCONSISTENCY** SUBJ# ',I12,' DID NOT CHECK TASK# ',
   *I3,' ON QUESTION 1 OR 2,BUT RESPONDED FOR THAT TASK ON QUESTION ',
   *I3/18X,'RESPONSE VALUE OF ',I1,' REPLACED WITH A 9')
270 FORMAT(I1,I12,13I1,65(100I1))
280 FORMAT('0')
290 FORMAT(1H0,'PROBLEM NO. ',I1,' COMPLETED,',I6,' RECORDS WRITTEN')
    END
```

SVCALC

Program SVCALC reads raw data from the MASTER file tape and creates a Summary Value file to be used as input to TABLES and LEVEL. The master file is assumed to reside on logical unit 1; the Summary Value file is written to unit 2. The deck set-up for executing SVCALC is:

1. System control cards.

2. SVCALC source program.

No parameter cards or card data are required to execute SVCALC. The program reads the header record on the Master file to determine the number of tasks, and reads respondent records until a zero is encountered in the problem number field (signifying end of dataset). Summary values are calculated for all tasks, and, at the conclusion of all calculations, a header record, followed by one summary value record for each task, are written to the Summary Value file. The process is automatically repeated for each problem (dataset) on the Master file.

Summary values are stored in three separate arrays in the program, KOL for integer information, COL for floating point information, and KH for character information. Each column of these arrays corresponds to a column of the printed tables. (Row subscripts identify task numbers.) The program, in essence, consists of two loops. The first reads subject records and accumulates necessary frequencies, sums, and sums of squares for each task, using all subjects for which appropriate information is present (i.e., appropriate indicator = 1). The second loop calculates means, medians, modes, standard deviations, quartiles, and percentages, using sums calculated in the first loop. The accompanying chart shows the contents associated with each column of the arrays KOL, COL, and KH, in both the first and second loops, and the table number and column heading associated with it.

Arrays are presently dimensioned to accommodate up to 500 tasks, requiring a region size of approximately 350K for execution. Region size can be substantially reduced by allowing for fewer tasks. For example, 100 tasks require only about 75K; 200 tasks required about 150K. Only two cards need to change in order to accomplish a reduction in region size:

1. In the DIMENSION statement, the dimension for IFILE should equal 13 x NT (where NT = number of tasks) and row dimensions for COL, KOL, and KH should equal NT.

2. The terminal index on the DO statement following statement number 5 should be NT.

The Summary Value file contains, for each dataset, one header record (including title and number of tasks), and one record for each task (rows of KOL, COL, KH horizontally augmented). The Summary Value file is written *unformatted* to preserve accuracy.

SVCALC STORAGE LOCATION (array and (subscript) KOL	COL	KH	1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
1			N for Q1 = 1		1	Q1(+)N
	1		N for Q1 = 2	KOL(1)*100/(KOL(1)+COL(1))	1	%
2				$\sum_{i=19}^{25}$ KOL(J)		No longer used
	2			KOL(2)*100/KOL(17)		No longer used
3				KOL(1)+KOL(2)		No longer used
	3			*KOL(3)*100/(KOL(1)+COL(1)+KOL(17))		No longer used
	4			COL(1)−COL(2)		No longer used
4			N for Q2 = 1		1	Q2(+)N
	5		N for Q2 = 2	KOL(4)*100/(KOL(4)+COL(5))	1	%
	6			COL(1)−COL(5)	1	Q1−Q2%
	7		$\sum$ X for Q12	COL(7)/KOL(5)	11	Worker Mean
	8		$\sum X^2$ for Q12	$*\sqrt{\frac{KOL(5)*COL(8)-COL(7)^2}{KOL(5)}}$	11	SD
5				KOL(10)+KOL(11)+KOL(12)	11	N
	9		$\sum$ X for Q13	COL(9)/KOL(6)	11	Super Mean
	10		$\sum X^2$ for Q13	$*\sqrt{\frac{KOL(6)*COL(10)-COL(9)^2}{KOL(6)}}$	11	SD
6				KOL(14)+KOL(15)+KOL(16)	11	N
	11			COL(7)−COL(9)	11	D:W S Means

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values

–SVCALC– STORAGE LOCATION (array and subscript)			1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
KOL	COL	KH				
	12			*COL(7)/KOL(7)	11	Worker Mean
	13			$*\sqrt{\frac{KOL(7)*COL(8)-COL(7)^2}{KOL(7)}}$	11	SD
7				KOL(9)+KOL(5)	11	N
	14			*COL(9)/KOL(8)	11	Super Mean
	15			$*\sqrt{\frac{KOL(8)*COL(10)-COL(9)^2}{KOL(8)}}$	11	SD
8				KOL(6)+KOL(13)	11	N
	16			COL(12)–COL(14)	11	D:W-S Means
9			N for Q1 = 2		11	Worker None
10			N for Q12 = 1		11	Low
11			N for Q12 = 2		11	Med
12			N for Q12 = 3		11	High
13			N for Q2 = 2		11	Super None
14			N for Q13 = 1		11	Low
15			N for Q13 = 2		11	Med
16			N for Q13 = 3		11	High
	17		Σ X for Q3	COL(17)/KOL(17)	4	Q3 Mean
	18		ΣX^2 for Q3	$*\sqrt{\frac{KOL(17)*(COL(18)-COL(17)^2}{KOL(17)}}$	4	SD
17			N for $0 \leq Q3 \leq T$		4	N
18			N for Q3 = 0		4	(Q3)0
19			N for Q3 = 1		4	1

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

SVCALC–STORAGE LOCATION (array and subscript) KOL	COL	KH	1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
20			N for Q3 = 2		4	2
21			N for Q3 = 3		4	3
22			N for Q3 = 4		4	4
23			N for Q3 = 5		4	5
24			N for Q3 = 6		4	6
25			N for Q3 = 7		4	7
	19			COL(2)	4	% Part Job
	20			$\frac{100}{KOL(17)} \sum_{j=22}^{25} KOL(j)$	4	% Sig
	21			Q_{50}(KOL(29) to KOL(35))	10	(Q10) Worker Mdn
	22			$\frac{Q_{75} - Q_{25}}{2}$ (KOL(29) to KOL(35))	10	Q
26				$\sum_{j=29}^{35} KOL(j)$	10	N
	23			Q_{50}(KOL(37) to KOL(43))	10	(Q11) Super Mdn
	24			$\frac{Q_{75} - Q_{25}}{2}$ (KOL(37) to KOL(43)	10	Q
27				$\sum_{j=37}^{43} KOL(j)$	10	N
	25			COL(21) - COL(23)	10	W-S Mdn
28			N for Q1 = 2		10	Worker None

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

–SVCALC– STORAGE LOCATION (array and subscript) KOL	COL	KH	1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
29			N for Q10 = 1		10	0+
30			N for Q10 = 2		10	Y–
31			N for Q10 = 3		10	1Y
32			N for Q10 = 4		10	1M
33			N for Q10 = 5		10	1W
34			N for Q10 = 6		10	1D
35			N for Q10 = 7		10	D+
	26			$\frac{(KOL(29)+KOL(30))^{*}100}{KOL(26)}$	10	% < 1Y
	27			$\frac{(KOL(33)+KOL(34)+KOL(35))^{*}100}{KOL(26)}$	10	% ≥ 1W
36			N for Q2 = 2		10	Super None
37			N for Q11 = 1		10	0+
38			N for Q11 = 2		10	Y–
39			N for Q11 = 3		10	1Y
40			N for Q11 = 4		10	1M
41			N for Q11 = 5		10	1W
42			N for Q11 = 6		10	1D
43			N for Q11 = 7		10	D+
	28			$\frac{(KOL(37)+KOL(38))^{*}100}{KOL(27)}$	10	% < 1Y
	29			$\frac{(KOL(41)+KOL(42)+KOL(43))^{*}100}{KOL(27)}$	10	% ≥ 1W

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

-SVCALC- STORAGE LOCATION (array and subscript) KOL	COL	KH	1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
	30			Q_{50}(KOL(45) to KOL(53))	8	(Q6) Mdn
	31			$\frac{Q_{75} - Q_{25}}{2}$ (KOL(46) to KOL(53))	8	Q
44				$\sum_{i=46}^{53}$ KOL(i)	8	N
45			N for Q2 = 2		8	None
46			N for Q8 = 1		8	0
47			N for Q8 = 2		8	Y+
48			N for Q8 = 3		8	3Y
49			N for Q8 = 4		8	Y
50			N for Q8 = 5		8	6M
51			N for Q8 = 6		8	3M
52			N for Q8 = 7		8	M
53			N for Q8 = 8		8	W
	32			$\frac{(KOL(46)+KOL(47)+KOL(48))*100}{KOL(44)}$	8	% Not Exp 1st Year
	33			$\frac{(KOL(51)+KOL(52)+KOL(53))*100}{KOL(44)}$	8	% Exp $\leq$ 3 Months
54			N for Q6 = 1		6	Worker P
		1		'*', if % P $\geq$ 20 (from MODX)	6	P
55			N for Q6 = 2		6	T
		2		'*', if % T $\geq$ 20 (from MODX)	6	T
56			N for Q6 = 3		6	S

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

–SVCALC– STORAGE LOCATION (array and subscript)			1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
KOL	COL	KH				
		3		'*', if % S $\geq$ 20 (from MODX)	6	S
57			N for Q6 = 4		6	E
		4		'*', if % E $\geq$ 20 (from MODX)	6	E
58			N for Q6 = 5		6	0
		5		'*', if % 0 $\geq$ 20 (from MODX)	6	0
59			N for Q6 = 6		6	N
60			N for Q6 = N/R		6	N/R
	34			SEE MODX	6	%P
	35			SEE MODX	6	%T
	36			SEE MODX	6	%S
	37			SEE MODX	6	%E
		6		SEE MODX	6	Mode MO
		7		SEE MODX	6	Mode MO
	38			SEE MODX	6	%
61			N for Q7 = 1		7	Supervisor P
		8		'*', if % P $\geq$ 20 (from MODX)	7	P
62			N for Q7 = 2		7	T
		9		'*', if % T $\geq$ 20 (from MODX)	7	T
63			N for Q7 = 3		7	S
		10		'*', if % S $\geq$ 20 (from MODX)	7	S
64			N for Q7 = 4		7	E
		11		'*', if % E $\geq$ 20 (from MODX)	7	E

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

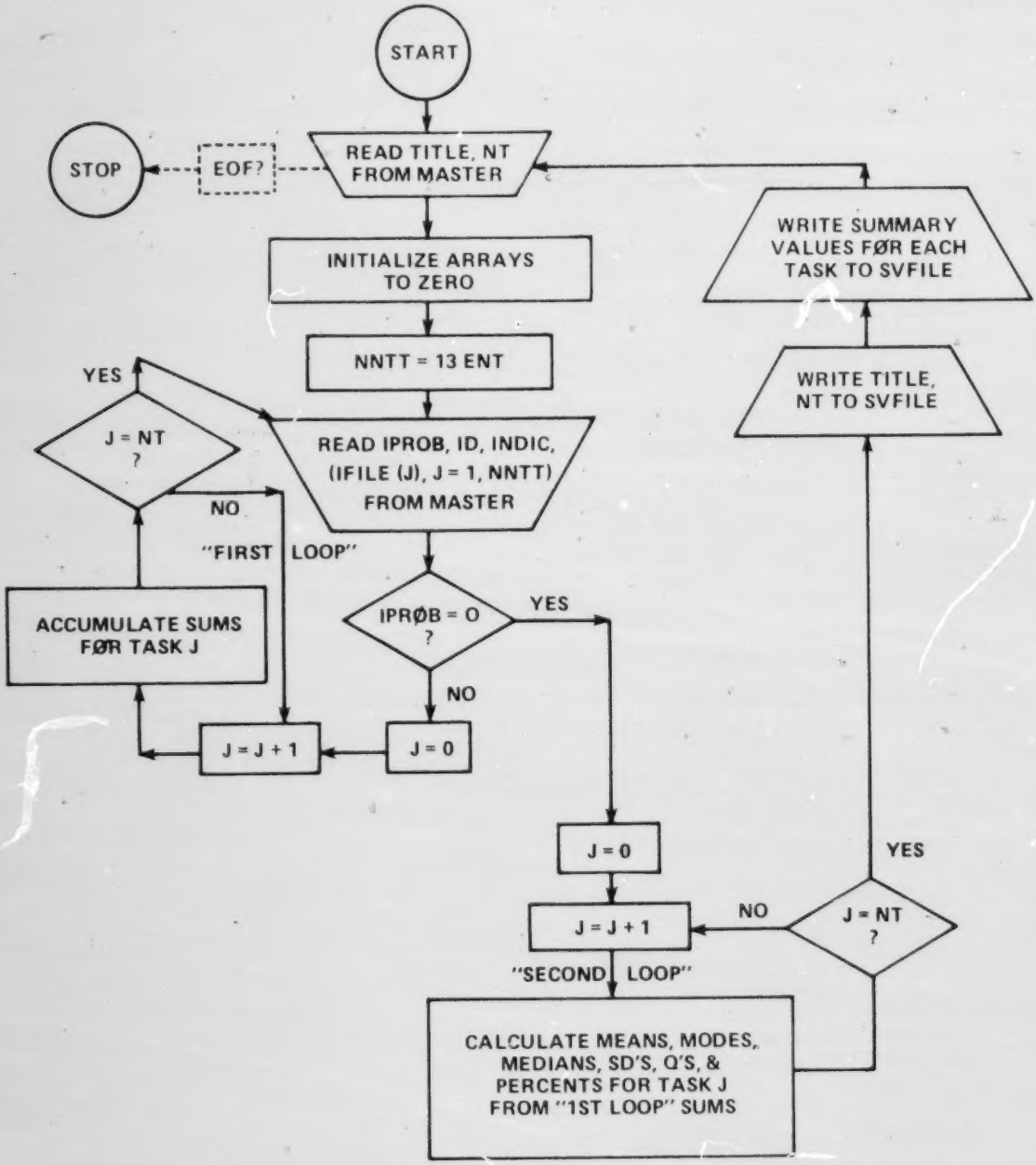
–SVCALC– STORAGE LOCATION (array and subscript) KOL	COL	KH	1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
65			N for Q7 = 5		7	O
		12		'*', if % O $\geq$ 20 (from MODX)	7	O
66			N for Q7 = 6		7	N
67			N for Q7 = N/R		7	N/R
	39			SEE MODX	7	%P
	40			SEE MODX	7	%T
	41			SEE MODX	7	%S
	42			SEE MODX		%E
		13		SEE MODX		Mode MO
		14		SEE MODX		Mode MO
	43			SEE MODX		%
68			N for 1 $\leq$ Q9 $\leq$ 8		9	Pos to IMP N
	44		N for 0 $\leq$ Q9 $\leq$ 9	$\frac{KOL(68)*100}{COL(44)}$	9	Pos to IMP %
		15		'*', if COL(44) $\geq$ 10	9	Pos to IMP %
69			N for Q9 = 1		9	IMP H
70			N for Q9 = 2		9	IMP D
71			N for Q9 = 3		9	IMP T
72			N for Q9 = 4		9	IMP R
73			N for Q9 = 5		9	IMP ?
74			N for Q9 = 6		9	IMP O
	45			SEE MODX	9	%T

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

–SVCALC– STORAGE LOCATION (array and subscript) KOL	COL	KH	1st LOOP CALCULATION (Q's refer to questions *not* section numbers)	2nd LOOP CALCULATION	TABLE NO.	COLUMN HEADING
		16		SEE MODX	9	Mode MO
		17		SEE MODX	9	Mode MO
	46			SEE MODX	9	%
	47		ΣX for Q4	COL(47)/KOL(75)	5	Q4 Mean
	48		ΣX^2 for Q4	$^{*}\sqrt{\frac{KOL(75)^{*}COL(48)-COL(47)^2}{KOL(75)}}$	5	SD
75			N for $0 \leq Q4 \leq 7$		5	N
76			N for Q4 = 0		5	(Q4) 0
77			N for Q4 = 1		5	1
78			N for Q4 = 2		5	2
79			N for Q4 = 3		5	3
80			N for Q4 = 4		5	4
81			N for Q4 = 5		5	5
82			N for Q4 = 6		5	6
83			N for Q4 = 7		5	7
	49			$\frac{100}{KOL(75)} \sum_{j=77}^{83} KOL(j)$	5	% Part Job
	50			$\frac{100}{KOL(75)} \sum_{j=80}^{83} KOL(j)$		% Sig

*Refers to values accumulated in the first loop before values have been replaced in the Second Loop. Values without (*) refers to second loop values.

SV CALC


START
STOP
EOF?
READ TITLE, NT FROM MASTER
INITIALIZE ARRAYS TO ZERO
NNTT = 13 ENT
READ IPROB, ID, INDIC, (IFILE (J), J = 1, NNTT) FROM MASTER
IPRØB = O ?
YES
NO
J = 0
J = J + 1
J = NT ?
YES
NO
"FIRST LOOP"
ACCUMULATE SUMS FØR TASK J
J = 0
J = J + 1
"SECOND LOOP"
CALCULATE MEANS, MODES, MEDIANS, SD'S, Q'S, & PERCENTS FOR TASK J FROM "1ST LOOP" SUMS
J = NT ?
YES
NO
WRITE TITLE, NT TO SVFILE
WRITE SUMMARY VALUES FØR EACH TASK TO SVFILE

```
C     PROGRAM SVCALC

      DIMENSION IFILE(6500),TITLE(10),COL(500,50),KOL(500,83),
     *KH(500,17),INDIC(13),MODE(2),ITEMP(8),PRCNT(8)
      DATA ISTAR/1H*/,IBLANK/1H /
    5 READ(1,310,END=300)TITLE,NT
      DO 20 I=1,500
      DO 10 J=1,50
   10 COL(I,J)=0.
      DO 20 J=1,83
   20 KOL(I,J)=0
      NNTT=13*NT
   25 READ(1,320)IPROB,IP,INDIC,(IFILE(J),J=1,NNTT)
      IF(IPROB.EQ.0)GO TO 160
      DO 150 J=1,NT
      IF(INDIC(1).EQ.0)GO TO 30
      IF(IFILE(J).EQ.1)KOL(J,1)=KOL(J,1)+1
      IF(IFILE(J).EQ.2)COL(J,1)=COL(J,1)+1.
   30 IF(INDIC(2).EQ.0)GO TO 40
      K=NT+J
      IF(IFILE(K).EQ.1)KOL(J,4)=KOL(J,4)+1
      IF(IFILE(K).EQ.2)COL(J,5)=COL(J,5)+1.
   40 IF(INDIC(3).EQ.0)GO TO 50
      IF(IFILE(J).EQ.2)KOL(J,28)=KOL(J,28)+1
      K=2*NT+J
      L=IFILE(K)
      IF(L.GE.1.AND.L.LE.7)KOL(J,28+L)=KOL(J,28+L)+1
   50 IF(INDIC(4).EQ.0)GO TO 60
      IF(IFILE(NT+J).EQ.2)KOL(J,36)=KOL(J,36)+1
      K=3*NT+J
      L=IFILE(K)
      IF(L.GE.1.AND.L.LE.7)KOL(J,36+L)=KOL(J,36+L)+1
   60 CONTINUE
   70 IF(INDIC(6).EQ.0)GO TO 80
      K=5*NT+J
      L=IFILE(K)
      IF(L.LT.0.OR.L.GE.8)GO TO 80
      KOL(J,18+L)=KOL(J,18+L)+1
      COL(J,17)=COL(J,17)+FLOAT(L)
      COL(J,18)=COL(J,18)+FLOAT(L**2)
      KOL(J,17)=KOL(J,17)+1
   80 IF(INDIC(7).EQ.0)GO TO 90
      IF(IFILE(NT+J).EQ.2)KOL(J,45)=KOL(J,45)+1
      K=6*NT+J
      L=IFILE(K)
      IF(L.GE.1.AND.L.LE.8)KOL(J,45+L)=KOL(J,45+L)+1
   90 IF(INDIC(8).EQ.0)GO TO 100
      IF(IFILE(J).EQ.2)KOL(J,9)=KOL(J,9)+1
      K=7*NT+J
      L=IFILE(K)
      IF(L.LT.1.OR.L.GT.3)GO TO 100
      KOL(J,9+L)=KOL(J,9+L)+1
      COL(J,7)=COL(J,7)+FLOAT(L)
      COL(J,8)=COL(J,8)+FLOAT(L**2)
  100 IF(INDIC(9).EQ.0)GO TO 110
```

```
      IF(IFILE(J+NT).EQ.2)KOL(J,13)=KOL(J,13)+1
      K=8*NT+J
      L=IFILE(K)
      IF(L.LT.1.OR.L.GT.3)GO TO 110
      KOL(J,13+L)=KOL(J,13+L)+1
      COL(J,9)=COL(J,9)+FLOAT(L)
      COL(J,10)=COL(J,10)+FLOAT(L**2)
  110 IF(INDIC(10).EQ.0)GO TO 120
      K=9*NT+J
      L=IFILE(K)
      IF(L.GE.1.AND.L.LE.6)KOL(J,68+L)=KOL(J,68+L)+1
      IF(L.GE.1.AND.L.LE.8)KOL(J,68)=KOL(J,68)+1
      IF(L.GE.0.AND.L.LE.9)COL(J,44)=COL(J,44)+1.0
  120 IF(INDIC(11).EQ.0)GO TO 130
      K=10*NT+J
      L=IFILE(K)
      IF(L.LT.0.OR.L.GE.8)GO TO 130
      KOL(J,76+L)=KOL(J,76+L)+1
      COL(J,47)=COL(J,47)+FLOAT(L)
      COL(J,48)=COL(J,48)+FLOAT(L**2)
      KOL(J,75)=KOL(J,75)+1
  130 IF(INDIC(12).EQ.0)GO TO 140
      K=11*NT+J
      L=IFILE(K)
      IF(L.EQ.0.OR.L.GT.6.OR.IFILE(J).EQ.2)KOL(J,60)=KOL(J,60)+1
      IF(L.GE.1.AND.L.LE.6)KOL(J,53+L)=KOL(J,53+L)+1
  140 IF(INDIC(13).EQ.0)GO TO 150
      K=12*NT+J
      L=IFILE(K)
      IF(L.EQ.0.OR.L.GT.6.OR.IFILE(J+NT).EQ.2)KOL(J,67)=KOL(J,67)+1
      IF(L.GE.1.AND.L.LE.6)KOL(J,60+L)=KOL(J,60+L)+1
  150 CONTINUE
      GO TO 25
  160 DO 290 J=1,NT
      X=FLOAT(KOL(J,1))+COL(J,1)
      IF(X.EQ.0.)GO TO 165
      COL(J,1)=FLOAT(KOL(J,1))*100./X
  165 KOL(J,2)=KOL(J,19)+KOL(J,20)+KOL(J,21)+KOL(J,22)+KOL(J,23)+
     *KOL(J,24)+KOL(J,25)
      IF(KOL(J,17).EQ.0)GO TO 170
      COL(J,2)=FLOAT(KOL(J,2))*100./FLOAT(KOL(J,17))
  170 KOL(J,3)=KOL(J,1)+KOL(J,2)
      X=FLOAT(KOL(J,17))+X
      IF(X.EQ.0.)GO TO 175
      COL(J,3)=FLOAT(KOL(J,3))*100./X
  175 COL(J,4)=COL(J,1)-COL(J,2)
      X=FLOAT(KOL(J,4))+COL(J,5)
      IF(X.EQ.0.)GO TO 180
      COL(J,5)=FLOAT(KOL(J,4))*100./X
  180 COL(J,6)=COL(J,1)-COL(J,5)
      KOL(J,5)=KOL(J,10)+KOL(J,11)+KOL(J,12)
      KOL(J,6)=KOL(J,14)+KOL(J,15)+KOL(J,16)
      KOL(J,7)=KOL(J,9)+KOL(J,5)
      KOL(J,8)=KOL(J,13)+KOL(J,6)
      IF(KOL(J,7).EQ.0)GO TO 185
```

```
      X=FLOAT(KOL(J,7))*COL(J,8)-COL(J,7)**2
      COL(J,13)=SQRT(X)/FLOAT(KOL(J,7))
      COL(J,12)=COL(J,7)/FLOAT(KOL(J,7))
      IF(KOL(J,5).EQ.0)GO TO 185
      X=FLOAT(KOL(J,5))*COL(J,8)-COL(J,7)**2
      COL(J,8)=SQRT(X)/FLOAT(KOL(J,5))
      COL(J,7)=COL(J,7)/FLOAT(KOL(J,5))
  185 IF(KOL(J,8).EQ.0)GO TO 190
      X=FLOAT(KOL(J,8))*COL(J,10)-COL(J,9)**2
      COL(J,15)=SQRT(X)/FLOAT(KOL(J,8))
      COL(J,14)=COL(J,9)/FLOAT(KOL(J,8))
      IF(KOL(J,6).EQ.0)GO TO 190
      X=FLOAT(KOL(J,6))*COL(J,10)-COL(J,9)**2
      COL(J,10)=SQRT(X)/FLOAT(KOL(J,6))
      COL(J,9)=COL(J,9)/FLOAT(KOL(J,6))
  190 COL(J,11)=COL(J,7)-COL(J,9)
      COL(J,16)=COL(J,12)-COL(J,14)
      IF(KOL(J,17).EQ.0)GO TO 200
      X=FLOAT(KOL(J,17))*COL(J,18)-COL(J,17)**2
      COL(J,18)=SQRT(X)/FLOAT(KOL(J,17))
      COL(J,17)=COL(J,17)/FLOAT(KOL(J,17))
      COL(J,19)=COL(J,2)
      COL(J,20)=FLOAT(KOL(J,22)+KOL(J,23)+KOL(J,24)+KOL(J,25))*100./-
     *FLOAT(KOL(J,17))
  200 DO 205 I=1,7
      ITEMP(I)=KOL(J,28+I)
  205 KOL(J,26)=KOL(J,26)+KOL(J,28+I)
      N=KOL(J,26)
      IF(N.EQ.0)GO TO 210
      CALL CNTILE(ITEMP,7,N,25,Q1)
      CALL CNTILE(ITEMP,7,N,50,Q2)
      CALL CNTILE(ITEMP,7,N,75,Q3)
      COL(J,21)=Q2
      COL(J,22)=(Q3-Q1)/2.
  210 DO 215 I=1,7
      ITEMP(I)=KOL(J,36+I)
  215 KOL(J,27)=KOL(J,27)+KOL(J,36+I)
      N=KOL(J,27)
      IF(N.EQ.0)GO TO 220
      CALL CNTILE(ITEMP,7,N,25,Q1)
      CALL CNTILE(ITEMP,7,N,50,Q2)
      CALL CNTILE(ITEMP,7,N,75,Q3)
      COL(J,23)=Q2
      COL(J,24)=(Q3-Q1)/2.
  220 COL(J,25)=COL(J,21)-COL(J,23)
      IF(KOL(J,26).EQ.0)GO TO 225
      X=FLOAT(KOL(J,26))
      COL(J,26)=FLOAT(KOL(J,29)+KOL(J,30))*100./X
      COL(J,27)=FLOAT(KOL(J,33)+KOL(J,34)+KOL(J,35))*100./X
  225 IF(KOL(J,27).EQ.0)GO TO 230
      X=FLOAT(KOL(J,27))
      COL(J,28)=FLOAT(KOL(J,37)+KOL(J,38))*100./X
      COL(J,29)=FLOAT(KOL(J,41)+KOL(J,42)+KOL(J,43))*100./X
  230 DO 235 I=1,8
      KOL(J,44)=KOL(J,44)+KOL(J,45+I)
```

```
235 ITEMP(I)=KOL(J,45+I)
    N=KOL(J,44)
    IF(N.EQ.0)GO TO 240
    CALL CNTILE(ITEMP,8,N,25,Q1)
    CALL CNTILE(ITEMP,8,N,50,Q2)
    CALL CNTILE(ITEMP,8,N,75,Q3)
    COL(J,30)=Q2
    COL(J,31)=(Q3-Q1)/2.
    COL(J,32)=FLOAT(KOL(J,46)+KOL(J,47)+KOL(J,48))*100./FLOAT(N)
    COL(J,33)=FLOAT(KOL(J,51)+KOL(J,52)+KOL(J,53))*100./FLOAT(N)
240 DO 250 I=1,7
250 ITEMP(I)=KOL(J,53+I)
    CALL MODX(ITEMP,7,20,12,PRCNT,MODE,PRC)
    COL(J,34)=PRCNT(1)
    COL(J,35)=PRCNT(2)
    COL(J,36)=PRCNT(3)
    COL(J,37)=PRCNT(4)
    COL(J,38)=PRC
    DO 255 I=1,5
    IF(PRCNT(I).GE.20.)KH(J,I)=ISTAR
    IF(PRCNT(I).LT.20.)KH(J,I)=IBLANK
255 CONTINUE
    KH(J,6)=MODE(1)
    KH(J,7)=MODE(2)
    DO 260 I=1,7
260 ITEMP(I)=KOL(J,60+I)
    CALL MODX(ITEMP,7,20,12,PRCNT,MODE,PRC)
    COL(J,39)=PRCNT(1)
    COL(J,40)=PRCNT(2)
    COL(J,41)=PRCNT(3)
    COL(J,42)=PRCNT(4)
    COL(J,43)=PRC
    DO 265 I=1,5
    IF(PRCNT(I).GE.20)KH(J,7+I)=ISTAR
    IF(PRCNT(I).LT.20)KH(J,7+I)=IBLANK
265 CONTINUE
    KH(J,13)=MODE(1)
    KH(J,14)=MODE(2)
    IF(COL(J,44).EQ.0.)GO TO 270
    COL(J,44)=FLOAT(KOL(J,68))*100./COL(J,44)
270 IF(COL(J,44).GE.10.)KH(J,15)=ISTAR
    IF(COL(J,44).LT.10.)KH(J,15)=IBLANK
    DO 275 I=1,6
275 ITEMP(I)=KOL(J,68+I)
    CALL MODX(ITEMP,6,20,10,PRCNT,MODE,PRC)
    COL(J,45)=PRCNT(3)
    COL(J,46)=PRC
    KH(J,16)=MODE(1)
    KH(J,17)=MODE(2)
    IF(KOL(J,75).EQ.0)GO TO 290
    X=FLOAT(KOL(J,75))*COL(J,48)-COL(J,47)**2
    COL(J,48)=SQRT(X)/FLOAT(KOL(J,75))
    COL(J,47)=COL(J,47)/FLOAT(KOL(J,75))
    DO 280 I=77,83
    IF(I.LT.80)GO TO 280
```

```
      COL(J,50)=COL(J,50)+FLOAT(KOL(J,I))
  280 COL(J,49)=COL(J,49)+FLOAT(KOL(J,I))
      COL(J,49)=100.*COL(J,49)/FLOAT(KOL(J,75))
      COL(J,50)=100.*COL(J,50)/FLOAT(KOL(J,75))
  290 CONTINUE
      WRITE(2)(TITLE(K),K=1,10),NT
      DO 295 J=1,NT
  295 WRITE(2) (KOL(J,K),K=1,83),(COL(J,K),K=1,50),(KH(J,K),K=1,17)
      GO TO 5
  300 WRITE(6,340)TITLE
      STOP
  310 FORMAT(10A4,I3)
  320 FORMAT(I1,I12,13I1,65(100I1))
  340 FORMAT(1H1,10A4,' COMPLETED')
      END
      SUBROUTINE MODX(ITEMP,LENGTH,PCRIT,IQST,PRCNT,MODE,PRC)
      DIMENSION ITEMP(8),MODE(2),IVAL1(7),IVAL2(8),IVAL3(6),PRCNT(8)
      DATA IVAL1/1HH,1HD,1HT,1HR,1H?,1HO,1H /,IVAL2/1HP,1HT,1HS,1HE,1HO,
     *1HN,1H ,1HM/,IVAL3/1HI,1HT,1HM,1HD,1H?,1HO/,MAXSUB/0/
      SUM=0.
      PRC=0.
      DO 10 I=1,LENGTH
      PRCNT(I)=0.
   10 SUM=SUM+FLOAT(ITEMP(I))
      IF(SUM.EQ.0.)GO TO 60
      XMAX=0.
      DO 20 I=1,LENGTH
      PRCNT(I)=FLOAT(ITEMP(I))*100./SUM
      IF(PRCNT(I).LE.XMAX)GO TO 20
      XMAX=PRCNT(I)
      MAXSUB=I
   20 CONTINUE
      IF(XMAX.LT.PCRIT)GO TO 60
      NOTIES=0
      DO 30 I=1,LENGTH
      IF(I.EQ.MAXSUB)GO TO 30
      IF(PRCNT(I).NE.XMAX)GO TO 30
      ITIE=I
      NOTIES=NOTIES+1
   30 CONTINUE
      IF(NOTIES.LE.1)GO TO 40
      MODE(1)=IVAL2(8)
      MODE(2)=IVAL2(8)
      PRC=0.0
      RETURN
   40 IF(IQST.EQ.10)MODE(1)=IVAL1(MAXSUB)
      IF(IQST.EQ.11)MODE(1)=IVAL3(MAXSUB)
      IF(IQST.EQ.12.OR.IQST.EQ.13)MODE(1)=IVAL2(MAXSUB)
      IF(NOTIES.EQ.1)GO TO 50
      GO TO 70
   50 IF(IQST.EQ.10)MODE(2)=IVAL1(ITIE)
      IF(IQST.EQ.11)MODE(2)=IVAL3(ITIE)
      IF(IQST.EQ.12.OR.IQST.EQ.13)MODE(2)=IVAL2(ITIE)
      GO TO 80
   60 MODE(1)=IVAL1(7)
```

```
70 MODE(2)=IVAL1(7)
80 IF(MAXSUB.NE.0)PRC=PRCNT(MAXSUB)
   RETURN
   END
   SUBROUTINE CNTILE(ITEMP,LENGTH,N,ICNT,Q)
   DIMENSION ITEMP(8)
   CUTPT=FLOAT(ICNT*N)/100.
   SUM=0.
   DO 20 I=1,LENGTH
   OLDSUM=SUM
   SUM=SUM+FLOAT(ITEMP(I))
   IF(SUM.GE.CUTPT)GO TO 10
   GO TO 20
10 Q=FLOAT(I)-.5+(CUTPT-OLDSUM)/FLOAT(ITEMP(I))
   I=LENGTH
20 CONTINUE
   RETURN
   END
```

TABLES

One parameter card is read by TABLES which specifies which of the eleven available tables are desired to be printed. The set-up for executing the TABLES program is:

1. System control cards.

2. TABLES Source deck.

3. Parameter card:

col	1	1 =	Table 1 to be printed
		0 =	Table 1 not printed
col	2	1 =	Table 2 to be printed
		0 =	Table 2 not printed
	.		
	.		
	.		
col	11	1 =	Table 11 to be printed
		0 =	Table 11 not printed

Tables 1 to 11 are written to logical units 11 to 21, respectively, which should all be defined as print datasets. This was done so that all tables could be constructed simultaneously with only one pass on the Summary Value file. For installations at which this structure is not feasible, there are two ways to circumvent the problem:

1. Define logical units 11-21 as separate temporary disk datasets. Upon completion of program TABLES, concatenate all non-empty datasets as input to a utility PRINT program.

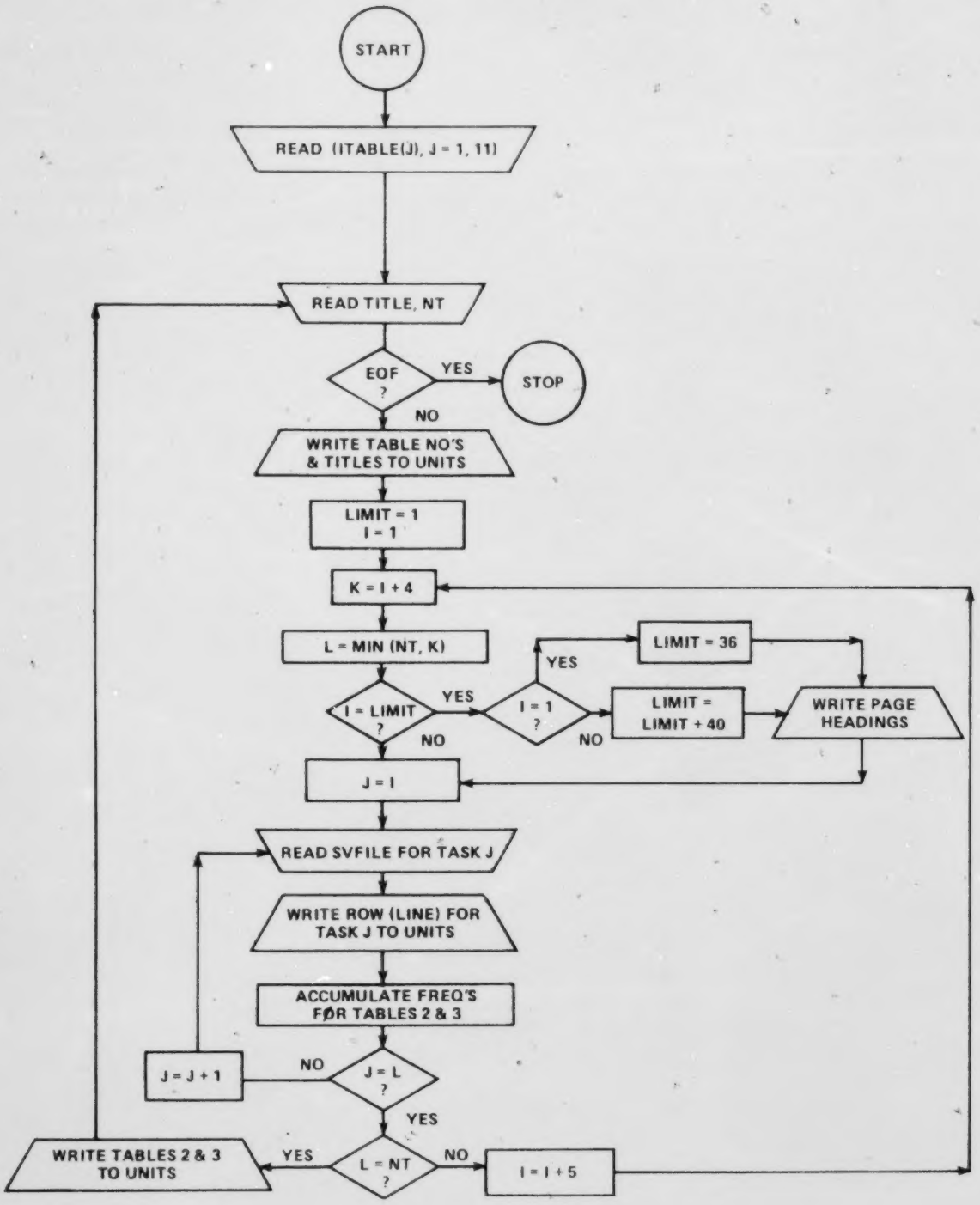
   —or—

2. Change all write statements in the program to the same printer—assigned logical unit number. Run the TABLES program several times, requesting only one table to be printed each run (on the parameter card).

Table titles are printed at the top of the first page of each table along with column headings. Subsequent pages contain column headings, but not the title. Asterisks appearing next to frequencies in Tables 6 and 7 indicate frequencies representing 20 or more percent of responses to that task. Asterisks adjacent to percentages in Table 9 flag values of 10 percent or greater. It should also be noted that "none" columns in Tables 8, 10, and 11 represent those respondents who received the question associated with the particular table, but who responded negatively to that task on Questions 1 or 2 and, hence, did not rate the task on other questions. This information is included for the investigator's information and to account for variance in sample sizes from task to task. It is not, however, used in the calculation of means, medians, percentages, etc.

Tables assume the Summary Value file to be resident of logical unit 1. The program will execute in approximately 60K.

TABLES


START
READ (ITABLE(J), J = 1, 11)
READ TITLE, NT
EOF ?
YES
STOP
NO
WRITE TABLE NO'S & TITLES TO UNITS
LIMIT = 1
I = 1
K = I + 4
L = MIN (NT, K)
LIMIT = 36
YES
I = LIMIT ?
YES
I = 1 ?
LIMIT = LIMIT + 40
WRITE PAGE HEADINGS
NO
NO
J = I
READ SVFILE FOR TASK J
WRITE ROW (LINE) FOR TASK J TO UNITS
ACCUMULATE FREQ'S FOR TABLES 2 & 3
J = J + 1
NO
J = L ?
YES
WRITE TABLES 2 & 3 TO UNITS
YES
L = NT ?
NO
I = I + 5

```
C     PROGRAM TABLES

      DIMENSION KOL(83),COL(50),KH(17),ITABLE(11),TITLE(10),L1(10,500),
     *L2(10,500),N1(10),N2(10),ITOT(69)
      DATA ITOT/69*0/,N1/10*0/,N2/10*0/
      READ(5,290)(ITABLE(J),J=1,11)
   20 READ(1,END=230)(TITLE(J),J=1,10),NT
      DO 30 I=1,11
      J=10+I
      IF(ITABLE(I).EQ.1)WRITE(J,300)TITLE
   30 CONTINUE
      IF(ITABLE(1).EQ.1)WRITE(11,310)
      IF(ITABLE (2).EQ.1)WRITE(12,380)
      IF(ITABLE (3).EQ.1)WRITE(13,390)
      IF(ITABLE (4).EQ.1)WRITE(14,330)
      IF(ITABLE (5).EQ.1)WRITE(15,335)
      IF(ITABLE(6).EQ.1)WRITE(16,360)
      IF(ITABLE (7).EQ.1)WRITE(17,365)
      IF(ITABLE (8).EQ.1)WRITE(18,350)
      IF(ITABLE (9).EQ.1)WRITE(19,370)
      IF(ITABLE(10).EQ.1)WRITE(20,340)
      IF(ITABLE(11).EQ.1)WRITE(21,320)
      LIMIT=1
      DO 160 I=1,NT,5
      K=I+4
      L=MINO(NT,K)
      IF(I.NE.LIMIT)GO TO 40
      IF(I.EQ.1)LIMIT=LIMIT+30
      IF(I.EQ.1)GO TO 35
      IF(I.GT.1)LIMIT=LIMIT+35
      IF(ITABLE(1).EQ.1)WRITE(11,400)
      IF(ITABLE (4).EQ.1)WRITE(14,400)
      IF(ITABLE (5).EQ.1)WRITE(15,400)
      IF(ITABLE (6).EQ.1)WRITE(16,400)
      IF(ITABLE (7).EQ.1)WRITE(17,400)
      IF(ITABLE (8).EQ.1)WRITE(18,400)
      IF(ITABLE (9).EQ.1)WRITE(19,400)
      IF(ITABLE(10).EQ.1)WRITE(20,400)
      IF(ITABLE(11).EQ.1)WRITE(21,400)
   35 IF(ITABLE(1).EQ.1)WRITE(11,410)
      IF(ITABLE (4).EQ.1)WRITE(14,430)
      IF(ITABLE (5).EQ.1)WRITE(15,430)
      IF(ITABLE (6).EQ.1)WRITE(16,460)
      IF(ITABLE (7).EQ.1)WRITE(17,460)
      IF(ITABLE (8).EQ.1)WRITE(18,450)
      IF(ITABLE (9).EQ.1)WRITE(19,470)
      IF(ITABLE(10).EQ.1)WRITE(20,440)
      IF(ITABLE(11).EQ.1)WRITE(21,420)
   40 DO 150 J=I,L
      READ(1)(KOL(K),K=1,83),(COL(K),K=1,50),(KH(K),K=1,17)
      IF(ITABLE(1).NE.1)GO TO 50
      WRITE(11,510)J,KOL(1),COL(1),KOL(4),COL(5),COL(6)
   50 IF(ITABLE(11).NE.1)GO TO 60
      DO 55 K=1,8
   55 ITOT(K)=ITOT(K)+KOL(8+K)
```

```
      WRITE(21,520)J,COL(7),COL(8),KOL(5),COL(9),COL(10),KOL(6),COL(11),
     *COL(12),COL(13),KOL(7),COL(14),COL(15),KOL(8),COL(16),
     *(KOL(K),K=9,16)
   60 IF(ITABLE (4).NE.1)GO TO 66
      DO 65 K=9,16
   65 ITOT(K)=ITOT(K)+KOL(9+K)
      WRITE(14,530)J,COL(17),COL(18),(KOL(K),K=17,25),COL(19),COL(20)
   66 IF(ITABLE (5).NE.1)GO TO 70
      DO 67 K=1,8
   67 ITOT(61+K)=ITOT(61+K)+KOL(75+K)
      WRITE(15,530)J,COL(47),COL(48),(KOL(K),K=75,83),COL(49),COL(50)
   70 IF(ITABLE(10).NE.1)GO TO 90
      DO 75 K=17,32
   75 ITOT(K)=ITOT(K)+KOL(11+K)
      DO 80 K=26,29
      IF(COL(K).GE.100.)COL(K)=99.9
   80 CONTINUE
      WRITE(20,540)J,COL(21),COL(22),KOL(26),COL(23),COL(24),KOL(27),
     *COL(25),(KOL(K),K=28,35),COL(26),COL(27),(KOL(K),K=36,43),COL(28),
     *COL(29)
   90 IF(ITABLE(8).NE.1)GO TO 100
      DO 95 K=33,41
   95 ITOT(K)=ITOT(K)+KOL(12+K)
      WRITE(18,550)J,COL(30),COL(31),(KOL(K),K=44,53),COL(32),COL(33)
  100 IF(ITABLE(6).NE.1)GO TO 115
      DO 105 K=42,48
  105 ITOT(K)=ITOT(K)+KOL(12+K)
      WRITE(16,560)J,(KOL(53+K),KH(K),K=1,5),KOL(59),KOL(60),COL(34),
     *COL(35),COL(36),COL(37),KH(6),KH(7),COL(38)
  115 IF(ITABLE(7).NE.1)GO TO 120
      DO 118 K=49,55
  118 ITOT(K)=ITOT(K)+KOL(12+K)
      WRITE(17,560)J,(KOL(53+K),KH(K),K=8,12),KOL(66),KOL(67),
     *(COL(K),K=39,42),KH(13),KH(14),COL(43)
  120 IF(ITABLE(9).NE.1)GO TO 130
      DO 125 K=56,61
  125 ITOT(K)=ITOT(K)+KOL(13+K)
      WRITE(19,570)J,KOL(68),COL(44),KH(15),(KOL(K),K=69,74),COL(45),
     *KH(16),KH(17),COL(46)
  130 IF(ITABLE(2).NE.1)GO TO 140
      K=IFIX(COL(1)/10.)+1
      IF(K.EQ.11)K=10
      N1(K)=N1(K)+1
      M=N1(K)
      L1(K,M)=J
  140 IF(ITABLE(3).NE.1)GO TO 150
      K=IFIX(COL(5)/10.)+1
      IF(K.EQ.11)K=10
      N2(K)=N2(K)+1
      M=N2(K)
      L2(K,M)=J
  150 CONTINUE
      IF(ITABLE(1).EQ.1)WRITE(11,500)
      IF(ITABLE (4).EQ.1)WRITE(14,500)
      IF(ITABLE (5).EQ.1)WRITE(15,500)
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      IF(ITABLE (6).EQ.1)WRITE(16,500)
      IF(ITABLE (7).EQ.1)WRITE(17,500)
      IF(ITABLE (8).EQ.1)WRITE(18,500)
      IF(ITABLE (9).EQ.1)WRITE(19,500)
      IF(ITABLE(10).EQ.1)WRITE(20,500)
      IF(ITABLE(11).EQ.1)WRITE(21,500)
  160 CONTINUE
      IF(ITABLE (4).EQ.1)WRITE(14,630)(ITOT(K),K=9,16)
      IF(ITABLE (5).EQ.1)WRITE(15,630)(ITOT(K),K=62,69)
      IF(ITABLE (6).EQ.1)WRITE(16,660)(ITOT(K),K=42,48)
      IF(ITABLE (7).EQ.1)WRITE(17,660)(ITOT(K),K=49,55)
      IF(ITABLE (8).EQ.1)WRITE(18,650)(ITOT(K),K=33,41)
      IF(ITABLE (9).EQ.1)WRITE(19,670)(ITOT(K),K=56,61)
      IF(ITABLE(10).EQ.1)WRITE(20,640)((ITOT(K),ITOT(K+8)),K=17,24)
      IF(ITABLE(11).EQ.1)WRITE(21,620)((ITOT(K),ITOT(K+4)),K=1,4)
      IF(ITABLE(2).NE.1)GO TO 180
      WRITE(12,480)
      DO 170 I=1,10
      N=N1(I)
      K=I*10-1
      J=K-9
      IF(K.EQ.99)K=100
      IF(N.GT.0)WRITE(12,580)J,K,N,(L1(I,M),M=1,N)
      IF(N.EQ.0)WRITE(12,580)J,K,N
  170 CONTINUE
  180 IF(ITABLE(3).NE.1)GO TO 200
      WRITE(13,460)
      DO 190 I=1,10
      N=N2(I)
      K=I*10-1
      J=K-9
      IF(K.EQ.99)K=100
      IF(N.GT.0)WRITE(13,580)J,K,N,(L2(I,M),M=1,N)
      IF(N.EQ.0)WRITE(13,580)J,K,N
  190 CONTINUE
  200 CONTINUE
      DO 210 I=1,67
  210 ITOT(I)=0
      DO 220 I=1,10
      N1(I)=0
  220 N2(I)=0
      GO TO 20
  230 STOP
  290 FORMAT(11I1)
  300 FORMAT(1H1,///52X,'TASK  INVENTORY  DATA  SUMMARY'/47X,10A4//52X,
     *30(1H-))
  310 FORMAT(53X,'TABLE  1:  TASK  OCCURRENCE'/52X,30(1H-)//)
  320 FORMAT(53X,'TABLE 11:  TASK  IMPORTANCE'/53X,'(Q12 & 13)'/52X,
     *30(1H-)/)
  330 FORMAT(53X,'TABLE  4:   EXTENT  TASK  IS'/55X,'(Q3)     PART OF ',
     *'THE JOB'/52X,30(1H-)/)
  335 FORMAT(53X,'TABLE  5:   EXTENT  TASK  IS'/55X,'(Q4)     PART OF ',
     *'THE JOB'/52X,30(1H-)/)
  340 FORMAT(53X,'TABLE 10:  FREQUENCY OF TASK'/53X,'(Q10 & 11)    ',
     *'PERFORMANCE'/52X,30(1H-)/)
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350 FORMAT(53X,'TABLE  8:  TIME TO QUALIFY'/55X,'(Q8)'/52X,30(1H-)/)
360 FORMAT(53X,'TABLE  6:  LEARNING LOCATION'/53X,'(Q6)        ',
   *'(WORKERS)'/52X,30(1H-)/)
365 FORMAT(53X,'TABLE  7:  LEARNING LOCATION'/53X,'(Q7)     ',
   *'(SUPERVISORS)'/,52X,30(1H-)/)
370 FORMAT(53X,'TABLE  9:',9X,'SUPERVISOR'/53X,'(Q9)',13X,
   *'SUGGESTIONS'/52X,30(1H-)/)
380 FORMAT(53X,'TABLE  2: SUMMARY OF TASKS BY'/54X,'(Q1)',6X,
   *'PERCENT PERFORMING'/52X,30(1H-)/)
390 FORMAT(53X,'TABLE  3: SUMMARY OF TASKS BY'/54X,'(Q2)',5X,
   *'PRCNT DESIRING PERF'/52X,30(1H-)/)
400 FORMAT(1H1////)
410 FORMAT(/41X,'|  PERFORMED BY WORKERS  | DESIRED BY SUPERVISORS |'/
   *41X,'|',24X,'|',24X,'|'/41X,'|',11X,'Q1(+)',8X,'|',9X,'Q2(+)',10X,
   *'|',3X,'D:Q1-Q2'/41X,'|',7X,11(1H-),6X,'|',6X,11(1H-),7X,'|',3X,
   *7(1H-)/34X,'TASK',3X,'|',8X,'N',7X,'%',7X,'|',7X,'N',7X,'%',8X,
   *'|',6X,'%'/)
420 FORMAT(10X'|',6X,'RESPONDENTS CITING WORKER',8X,'|',6X,'ALL ',
   *'RESPONDENTS,  INCLUDING',6X,'|  DISTRIBUTION      |  DISTRIBUTION'
   */10X,'|',8X,'PERFORMANCE OF A TASK',10X,'|',7X,'NON-PERFORMANCE ',
   *'CITATIONS',7X,'|',8X,'OF',9X,'|',8X,'OF'/10X,'|',39X,'|',39X,'|',
   *6X,'WORKER',7X,'|',4X,'SUPERVISOR'/10X,'|',5X,'WORKERS',7X,
   *'SUPERVISORS   D:W-S |',5X,'WORKERS',7X,'SUPERVISORS    D:W-S|',
   *5X,'RESPONSES',5X,'|',5X,'RESPONSES'/10X,'|  ',13(1H-),3X,13(1H-),
   *2X,5(1H-),' |  ',13(1H-),3X,13(1H-),3X,5(1H-),'| ',17(1H-),' | ',
   *17(1H-)/4X,'TASK  |  MEAN  SD   N    MEAN  SD   N    MEAN |  ',
   *'MEAN  SD   N    MEAN  SD   N    MEAN | NONE LOW MED HIGH | ',
   *'NONE LOW MED HIGH'/)
430 FORMAT (//23X,'|',21X,'|',7X,'NUMBER  OF  RESPONSES  PER  ',
   *'CATEGORY',8X,'|'/23X,'|',21X,'|',51X,'|  % PART   %  SIG'/17X,
   *'TASK  |  MEAN    SD     N   |    0     1     2     3     4  ',
   *'   5     6     7    |  OF JOB    PART'/17X,'----  |  ----   ',
   *'----   ---- |   ---   ---   ---   ---   ---   ---   ---   ---  ',
   *' |  ------   ------'/)
440 FORMAT(/7X,'|    ACTUAL     SUPERVISOR',7X,'|',45X,'|'/7X,'|',4X,
   *'WORKER     FREQUENCY',8X,'|',6X,'DISTRIBUTION OF WORKER',7X,
   *'PERF PERF |   DISTRIBUTION OF SUPERVISOR',7X,'DES  DES'/7X,'|  ',
   *'FREQUENCY      DESIRE   D:W-S |   FREQUENCY OF TASK PERFORMANCE',
   *4X,'<1Y >=1W |   DESIRES FOR TASK FREQUENCY',7X,'<1Y >=1W'/7X,'|',
   *1X,11(1H-),2X,11(1H-),2X,4(1H-),' | ',32(1H-),2X,4(1H-),1X,4(1H-),
   *' | ',32(1H-),2X,4(1H-),1X,4(1H-)/2X,'TASK | MDN  Q   N   MDN  Q',
   *'   N    MEA | NONE  0+  Y-  1Y  1M  1W  1D  D+    %    %  | ',
   *'NONE  0+  Y-  1Y  1M  1W  1D  D+    %    %'/)
450 FORMAT(//23X,'|',19X,'|',8X,'DISTRIBUTION OF SUPERVISOR ',
   *'EXPECTATIONS',7X,'|  %  NOT   %  EXP'/24X,'|',18X,'|',54X,
   *'|  EXP IN   3 MOS'/13X, 'TASK  |  MDN    Q    N  | NONE    0  ',
   *'   Y+    3Y    Y    6M    3M    M    W  |  1ST YR   OR LESS'/
   *19X,'----  | ----  ----  ---  | ---    ---   ---   ---   ---  ',
   *'---   ---   ---   --- |  ------   ------'/)
460 FORMAT(/23X,'|',12X,'DISTRIBUTION OF',16X,'|',20X,'|'/23X,'|',7X,
   *'SUGGESTED LEARNING PROCESS',10X,'|',9X,'PERCENTAGES',10X,'|',4X,
   *'SUGGESTED'/23X,'(1H-)/16X,'TASK  |    P    T    S    E    O'-
   *'    P    S/R  |    P    T    S    E  | MORE    ?'/22X,
   *'|',43X,'|',22X,'|')
470 FORMAT(//23X,'|  POSSIBLE  |    DISTRIBUTION OF MEANS'/18X,
```

```
   *'| TO IMPROVE |        FOR IMPROVEMENT',17X,'MODE     '/39X,'|',
   *42(1H-),8X,8(1H-)/34X,'TASK |  N      %   |  H    D    T    R  ',
   *'  ?    0    %T    NO    %'/)
480 FORMAT(3X,'PERCENTAGE'/5X,'RANGE    |NO. TASKS| TASK NUMBERS')
500 FORMAT(1H0)
510 FORMAT(35X,I3,3X,'|',7X,I3,3X,F5.1,6X,'|',6X,I3,3X,F5.1,7X,'|',3X,
   *F6.1)
520 FORMAT(5X,I3,'  |  ',2(F3.1,2X,F3.1,2X,I3,3X),F4.1,' |  ',
   *2(F3.1,2X,F3.1,2X,I3,3X),F4.1,1X,2('| ',4I4,2X))
530 FORMAT(18X,I3,2X,'|',2X,F4.2,3X,F4.2,3X,I3,'  |',8I6,3X,'|',2X,
   *F5.1,4X,F5.1)
540 FORMAT(3X,I3,' |',2F4.1,I4,1X,2F4.1,I4,F6.1,' | ',I3,1X,7I4,1X,
   *2F5.1,' | ',I3,1X,7I4,1X,2F5.1)
550 FORMAT(19X,I3,'  | ',F4.2,F6.2,I5,'  | ',I3,1X,8I6,' |  ',F5.1,4X,
   *F5.1)
560 FORMAT(17X,I3,'  |',5(2X,I3,A1),2X,I3,3X,I3,'  |',4F7.1,'  |  ',
   *2A1,2X,F5.1)
570 FORMAT(34X,I3,'  | ',I3,F7.1,A1,'|',6(1X,I3,1X),F5.1,2X,2A1,F6.1)
580 FORMAT(13X,'|',9X,'|'/4X,123(1H-)/4X,I2,' -',I3,2X,'|',3X,I3,3X,
   *'|',1X,25I4/(13X,'|',9X,'|',1X,25I4))
620 FORMAT(1H0,82X,'TOTALS:',2X,I5,15X,I5/95X,I5,15X,I5/99X,I5,15X,
   *I5/103X,I5,15X,I5)
630 FORMAT(1H0,38X,'TOTALS:',8I6)
640 FORMAT(1H0,32X,'TOTALS:',2X,I5,41X,I5/45X,I5,41X,I5/49X,I5,41X,I5/
   *53X,I5,41X,I5/57X,I5,41X,I5/61X,I5,41X,I5/65X,I5,41X,I5/69X,I5,
   *41X,I5)
650 FORMAT(1H0,34X,'TOTALS:',I6,1X,8I6)
660 FORMAT(13X,'TOTALS:',2X,7I6)
670 FORMAT(1H0,44X,'TOTALS:',6I5,31X,6I5)
    END
```

Table A-1
Data Summary Table 1, Task Occurrence

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 1: TASK OCCURRENCE

TASK	PERFORMED BY WORKERS Q1(+) N	%	DESIRED BY SUPERVISORS Q2(+) N	%	D:Q1-Q2 %
1	2	3.3	12	15.0	-11.7
2	13	21.7	22	27.5	-5.8
3	16	26.7	41	51.3	-24.6
4	15	25.0	22	27.5	-2.5
5	21	35.0	34	42.5	-7.5
6	34	56.7	52	65.0	-8.3
7	36	60.0	54	67.5	-7.5
8	6	10.0	11	13.8	-3.8
9	8	13.3	26	32.5	-19.2
10	3	5.0	13	16.3	-11.3
11	21	35.0	42	52.5	-17.5
12	9	15.0	17	21.3	-6.3
13	1	1.7	14	17.5	-15.8
14	7	11.7	13	16.3	-4.6
15	24	40.0	47	58.8	-18.8
16	31	51.7	50	62.5	-10.8
17	25	41.7	37	46.3	-4.6
18	13	21.7	24	30.0	-8.3
19	11	18.3	9	11.3	7.1
20	12	20.0	27	33.8	-13.8
21	5	8.3	15	18.8	-10.4
22	9	15.0	24	30.0	-15.0
23	3	5.0	17	21.3	-16.3
24	0	0.0	11	13.8	-13.8
25	17	28.3	31	38.8	-10.4
26	18	30.0	24	30.0	0.0
27	38	63.3	62	77.5	-14.2
28	3	5.0	5	6.3	-1.3
29	15	25.0	15	18.8	6.3
30	12	20.0	18	22.5	-2.5

Table A-2
Data Summary Table 2, Summary of Tasks by Percent Performing

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 2: SUMMARY OF TASKS BY
(C1) PERCENT PERFORMING

PERCENTAGE RANGE	NO. TASKS	TASK NUMBERS
0 - 9	165	1 10 13 21 23 24 28 41 45 46 51 53 55 57 60 64 66 67 68 69 70 71 73 80 81 85 87 93 94 102 103 106 111 114 117 122 124 130 131 134 136 137 140 143 145 146 150 151 156 158 162 165 169 170 171 173 177 179 183 188 195 199 200 201 202 204 207 209 210 211 212 214 216 217 220 222 223 224 225 226 227 232 234 236 238 241 245 246 247 248 252 253 255 256 257 258 259 260 261 265 266 268 269 270 271 272 273 277 278 280 281 283 286 287 288 289 291 292 293 294 297 298 299 300 301 302 305 306 307 308 309 310 313 317 318 321 332 364 369 370 371 372 374 379 383 385 387 410 413 416 421 422 425 431 436 441 446 451 454 455 472 473 474 478 488
10 - 19	104	8 9 12 14 19 22 31 32 33 35 40 43 47 49 52 54 56 58 65 75 88 89 91 95 101 105 108 109 110 112 116 127 129 132 139 144 148 152 155 160 166 167 168 174 184 194 197 203 205 206 215 218 221 228 230 235 240 242 243 244 249 250 251 254 262 263 264 267 274 275 276 282 285 290 303 304 311 312 314 315 316 319 355 357 368 373 381 388 396 403 405 412 415 419 426 427 428 434 444 450 453 465 468 487
20 - 29	57	2 3 4 18 20 25 29 30 42 50 59 74 82 97 98 99 104 112 115 131 141 157 159 164 172 182 191 196 198 213 219 239 295 322 323 324 326 328 350 358 377 382 397 400 414 429 432 435 443 445 456 457 461 463 471 486 490
30 - 39	32	5 11 26 39 44 63 72 90 107 119 123 125 142 161 175 176 208 229 231 232 237 279 335 [illegible] 365 378 408 452 467 469 475 479
40 - 49	26	15 17 36 37 75 76 77 83 100 118 121 126 154 163 181 284 320 325 334 341 354 359 406 477 480 491
50 - 59	26	6 16 61 78 84 92 120 135 147 156 187 193 296 380 391 398 399 440 442 455 464 476 482 483 485 492
60 - 69	29	7 27 34 48 86 96 138 149 153 185 189 190 229 331 336 342 347 353 363 366 386 390 417 423 424 439 447 484 489
70 - 79	24	62 128 180 192 340 349 351 352 360 375 376 389 404 409 411 418 430 433 445 449 458 460 462 481
80 - 89	15	38 179 330 333 338 343 345 356 393 394 407 420 437 466 470
90 -100	14	327 339 344 346 348 361 362 367 384 392 395 401 402 438

Table A-3

Data Summary Table 3, Summary of Tasks by Percent Desiring Performance

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 3: SUMMARY OF TASKS BY
(C2) PRCNT DESIRING PERF

PERCENTAGE RANGE	NO. TASKS	TASK NUMBERS
0 - 9	140	28 46 54 60 64 68 70 71 73 85 87 93 94 103 106 124 130 134 136 137 139 143 145 146 148 150 151 168 178 183 195 197 199 200 201 202 203 204 205 206 207 208 210 211 212 214 215 216 217 218 220 222 223 224 225 226 227 228 232 234 235 236 238 240 241 242 243 244 245 246 247 248 249 250 253 256 257 258 259 260 261 262 263 265 266 267 268 269 271 272 273 275 276 277 278 280 281 283 286 287 288 291 292 293 294 297 300 301 304 305 306 307 308 309 310 312 321 328 332 357 364 368 369 371 372 374 383 385 387 412 413 416 419 421 436 451 454 455 473 486
10 - 19	107	4 8 10 13 14 19 21 24 29 31 32 41 42 45 47 51 52 53 55 56 57 66 67 68 79 80 88 91 95 97 99 101 102 111 114 117 122 127 131 132 140 144 158 159 160 162 165 166 167 169 170 173 174 177 188 194 213 219 221 230 251 252 255 264 270 274 282 285 289 290 295 299 302 311 313 316 317 324 326 350 355 370 373 379 388 405 410 414 415 422 425 426 427 428 431 432 441 446 450 452 463 465 468 472 474 478 487
20 - 29	58	2 4 12 23 30 33 35 40 43 65 81 89 90 98 105 108 110 112 115 119 129 133 141 152 155 156 161 164 176 184 196 198 208 239 254 279 295 303 314 315 318 319 358 365 377 382 397 403 429 434 444 456 457 461 469 471 486 490
30 - 39	43	9 18 20 22 25 26 39 44 49 50 58 59 63 83 109 116 118 123 142 149 157 162 171 172 182 191 229 233 323 324 335 378 381 396 398 400 408 435 443 448 475 482 491
40 - 49	25	5 17 36 37 72 74 82 84 100 104 107 125 126 147 154 175 284 322 325 337 354 467 477 479 480
50 - 59	35	3 11 15 77 92 113 120 121 135 153 181 186 231 237 296 329 331 336 341 347 359 366 380 384 391 399 442 452 459 464 468 476 483 484 492
60 - 69	34	6 7 16 34 48 62 75 76 96 138 185 187 189 190 193 220 349 351 353 375 378 380 394 408 409 417 430 439 440 449 458 460 481 485
70 - 79	23	27 61 78 86 128 179 180 192 347 360 363 389 393 404 420 423 424 433 438 445 447 462 469
80 - 89	20	38 330 333 339 343 344 345 346 352 356 361 362 392 395 402 407 411 418 437 470
90 -100	7	327 338 340 348 367 384 401

Table A-4
Data Summary Table 4, Extent Task Is Part of the Position

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 4: EXTENT TASK IS PART OF THE JOB
(Q3)

TASK	MEAN	SD	N	NUMBER OF RESPONSES PER CATEGORY 0	1	2	3	4	5	6	7	% PART OF JOB	% SIG. PART
1	0.20	0.95	59	54	3	1	0	0	0	0	1	8.5	1.7
2	1.37	1.71	60	28	11	6	7	5	1	1	1	53.3	13.3
3	1.10	1.40	59	29	13	6	5	5	1	0	0	40.7	10.2
4	1.12	1.48	60	29	14	7	4	5	0	0	1	51.7	10.0
5	1.22	1.34	60	25	15	8	6	6	0	0	0	48.3	10.0
6	2.64	2.16	58	13	8	10	5	12	2	4	4	77.6	37.9
7	3.13	2.29	60	10	9	5	11	8	5	5	7	83.3	41.7
8	0.58	1.32	60	45	7	3	2	1	0	2	0	25.0	5.0
9	1.05	1.77	60	35	12	2	4	4	1	0	2	41.7	11.7
10	0.43	1.23	60	50	4	2	1	2	0	0	1	16.7	5.0
11	1.77	1.71	60	18	13	12	6	7	2	1	1	70.0	19.3
12	1.15	1.74	60	34	9	5	5	4	1	0	2	43.3	11.7
13	0.30	0.86	60	51	5	1	1	2	0	0	0	15.0	3.3
14	0.62	1.43	60	47	4	3	0	5	0	0	1	21.7	10.0
15	1.90	2.02	60	24	7	8	5	9	4	1	2	60.0	26.7
16	2.57	2.00	60	10	10	13	10	9	0	4	4	83.3	26.3
17	2.30	2.39	60	22	7	5	9	7	1	2	7	63.3	28.3
18	1.48	2.00	60	32	7	4	5	6	2	3	1	46.7	20.0
19	0.56	1.27	59	45	5	4	3	1	0	0	1	23.7	3.4
20	1.32	1.77	60	24	19	8	3	2	0	1	3	40.0	10.0
21	0.53	1.31	60	46	8	1	2	1	1	0	1	23.3	5.0
22	0.70	0.99	60	33	18	5	2	2	0	0	0	45.0	3.3
23	1.55	2.09	60	31	7	6	3	8	1	0	4	48.3	21.7
24	0.67	1.42	60	45	5	3	2	4	0	0	1	25.0	8.3
25	1.62	1.92	60	26	8	10	5	7	1	0	3	56.7	18.3
26	1.58	2.05	60	30	7	6	4	8	1	1	3	50.0	21.7
27	3.00	2.04	60	8	7	10	12	13	1	3	6	86.7	38.3
28	0.12	0.37	60	54	5	1	0	0	0	0	0	10.0	0.0
29	0.92	1.46	60	35	11	7	2	3	1	0	1	41.7	8.3
30	1.13	1.98	60	38	7	5	2	3	0	2	3	36.7	13.3

Table A-5
Data Summary Table 5, Extent Task Is Part of the Job

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 5: EXTENT TASK IS
(Q4) PART OF THE JOB

TASK	MEAN	SD	N	NUMBER OF RESPONSES PER CATEGORY 0	1	2	3	4	5	6	7	% PART OF JOB	CUM %
1	4.70	1.77	60	0	2	4	10	15	9	3	17	100.0	[illegible]
2	4.38	2.00	60	3	3	4	7	17	6	7	13	[illegible]	[illegible]
3	5.93	1.53	60	0	1	0	4	10	3	6	36	[illegible]	[illegible]
4	3.88	2.21	60	6	6	1	12	15	2	7	11	[illegible]	[illegible]
5	0.85	1.62	60	39	11	2	3	2	1	0	2	[illegible]	[illegible]
6	2.38	1.89	60	12	11	7	15	10	1	0	4	[illegible]	[illegible]
7	3.87	1.78	60	2	2	9	13	17	5	4	3	[illegible]	[illegible]
8	4.78	1.91	60	0	2	6	9	14	4	5	20	100.0	[illegible]
9	2.63	2.33	60	15	8	9	10	5	4	1	8	[illegible]	[illegible]
10	0.87	1.66	60	42	5	4	3	4	0	0	2	[illegible]	[illegible]
11	4.58	1.88	60	0	3	6	7	19	5	2	18	100.0	[illegible]
12	0.53	1.49	60	50	3	2	1	2	0	0	2	[illegible]	[illegible]
13	1.08	1.71	60	34	10	6	5	2	0	1	2	[illegible]	[illegible]
14	4.10	2.47	60	8	5	2	7	13	4	3	18	[illegible]	[illegible]
15	4.08	2.15	60	2	4	8	10	13	4	3	16	[illegible]	[illegible]
16	4.83	1.92	60	0	1	8	9	11	5	5	21	100.0	[illegible]
17	4.73	1.93	60	0	3	6	7	15	6	3	20	100.0	[illegible]
18	3.78	2.23	60	5	6	6	10	15	2	1	14	[illegible]	[illegible]
19	0.13	0.69	60	57	1	1	0	0	1	0	0	[illegible]	[illegible]
20	1.53	2.85	60	38	5	1	0	2	1	1	12	[illegible]	[illegible]
21	2.58	2.10	60	13	9	8	9	14	1	0	6	[illegible]	[illegible]
22	4.63	1.83	60	1	2	3	6	17	8	5	18	[illegible]	[illegible]
23	0.32	0.79	60	49	6	3	1	1	0	0	0	[illegible]	[illegible]
24	0.23	0.97	60	54	3	2	0	0	0	0	1	10.0	[illegible]
25	0.35	1.08	60	50	6	1	2	0	0	0	1	16.7	[illegible]
26	0.05	0.25	60	58	1	1	0	0	0	0	0	[illegible]	[illegible]
27	0.07	0.25	60	56	4	0	0	0	0	0	0	[illegible]	[illegible]
28	0.18	0.62	60	53	5	1	0	1	0	0	0	11.7	[illegible]
29	0.08	0.53	60	58	1	0	0	1	0	0	0	[illegible]	[illegible]
30	2.07	1.67	60	9	17	16	7	6	2	1	2	[illegible]	[illegible]

Table A-6
Data Summary Table 6, Learning Location (Workers)

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 6: LEARNING LOCATION
(96) (WORKERS)

TASK	DISTRIBUTION OF SUGGESTED LEARNING SOURCES							PERCENTAGES				MODE	
	P	T	S	E	O	N	N/R	P	T	S	E	MODE	%
1	2	6	30*	2	0	19	1	3.3	10.0	50.0	3.3	S	50.0
2	0	17*	31*	8	0	3	1	0.0	28.3	51.7	13.3	S	51.7
3	0	11	31*	8	0	9	1	0.0	18.3	51.7	13.3	S	51.7
4	2	5	23*	8	1	19	2	3.3	8.3	38.3	13.3	S	38.3
5	0	5	21*	9	0	23	2	0.0	8.3	35.0	15.0	N	38.3
6	2	9	32*	14*	0	3	0	3.3	15.0	53.3	23.3	S	53.3
7	7	21*	24*	6	0	1	1	11.7	35.0	40.0	10.0	S	40.0
8	2	18*	15*	2	0	22	1	3.3	30.0	25.0	3.3	N	36.7
9	7	5	16*	8	0	23	1	11.7	8.3	26.7	13.3	N	38.3
10	1	10	25*	8	0	15	1	1.7	16.7	41.7	13.3	S	41.7
11	8	18*	16*	11	0	7	0	13.3	30.0	26.7	18.3	T	30.0
12	4	24*	14*	5	0	12	1	6.7	40.0	23.3	8.3	T	40.0
13	2	12*	15*	11	0	19	1	3.3	20.0	25.0	18.3	N	31.7
14	1	11	18*	9	0	20	1	1.7	18.3	30.0	15.0	N	33.3
15	2	9	35*	4	0	10	0	3.3	15.0	58.3	6.7	S	58.3
16	2	13*	30*	9	0	4	2	3.3	21.7	50.0	15.0	S	50.0
17	2	17*	27*	7	0	6	1	3.3	28.3	45.0	11.7	S	45.0
18	4	27*	15*	5	0	8	1	6.7	45.0	25.0	8.3	T	45.0
19	3	23*	14*	3	0	16	1	5.0	38.3	23.3	5.0	T	38.3
20	3	10	31*	7	0	8	1	5.0	16.7	51.7	11.7	S	51.7
21	2	9	23*	4	0	21	1	3.3	15.0	38.3	6.7	S	38.3
22	2	12*	26*	6	0	13	1	3.3	20.0	43.3	10.0	S	43.3
23	4	17*	18*	11	0	10	0	6.7	28.3	30.0	18.3	S	30.0
24	1	10	19*	12*	0	17	1	1.7	16.7	31.7	20.0	S	31.7
25	0	4	37*	11	1	6	1	0.0	6.7	61.7	18.3	S	61.7
26	1	12*	30*	7	1	8	1	1.7	20.0	50.0	11.7	S	50.0
27	4	11	31*	9	0	5	0	6.7	18.3	51.7	15.0	S	51.7
28	2	20*	16*	6	0	15	1	3.3	33.3	26.7	10.0	T	33.3
29	3	6	29*	10	0	11	1	5.0	10.0	48.3	16.7	S	48.3
30	5	5	26*	8	0	15	1	8.3	8.3	43.3	13.3	S	43.3

Table A-7
Data Summary Table 7, Learning Location (Supervisors)

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 7: LEARNING LOCATION
(Q7) (SUPERVISORS)

TASK	DISTRIBUTION OF SUGGESTED LEARNING SOURCES							PERCENTAGES				MODE	
	P	T	S	F	O	N	N/R	P	T	S	F	MODE	%
1	0	1	4	1	0	0	34	0.0	2.5	10.0	2.5		85.0
2	0	2	7	0	0	0	31	0.0	5.0	17.5	0.0		77.5
3	0	1	15*	0	0	0	24	0.0	2.5	37.5	0.0		60.0
4	1	5	7	0	0	0	27	2.5	12.5	17.5	0.0		67.5
5	0	2	8*	3	0	6	21	0.0	5.0	20.0	7.5		52.5
6	2	4	15*	4	0	0	15	5.0	10.0	37.5	10.0	S	37.5
7	2	10*	11*	2	0	0	15	5.0	25.0	27.5	5.0		37.5
8	0	0	4	1	0	1	34	0.0	0.0	10.0	2.5		85.0
9	1	1	10*	2	0	4	22	2.5	2.5	25.0	5.0		55.0
10	1	0	7	1	0	0	31	2.5	0.0	17.5	2.5		77.5
11	2	10*	8*	2	0	1	17	5.0	25.0	20.0	5.0		42.5
12	0	5	4	1	0	0	30	0.0	12.5	10.0	2.5		75.0
13	0	3	2	1	0	0	34	0.0	7.5	5.0	2.5		85.0
14	0	3	2	1	0	0	34	0.0	7.5	5.0	2.5		85.0
15	1	6	13*	4	0	0	16	2.5	15.0	32.5	10.0		40.0
16	0	17*	7	4	0	0	12	0.0	42.5	17.5	10.0	T	42.5
17	1	12*	8*	2	0	0	17	2.5	30.0	20.0	5.0		42.5
18	2	7	6	1	0	0	24	5.0	17.5	15.0	2.5		60.0
19	0	2	1	0	0	0	37	0.0	5.0	2.5	0.0		92.5
20	0	7	12*	0	0	0	21	0.0	17.5	30.0	0.0		52.5
21	0	4	4	1	0	0	31	0.0	10.0	10.0	2.5		77.5
22	0	3	7	2	1	0	27	0.0	7.5	17.5	5.0		67.5
23	0	9*	3	0	0	0	28	0.0	22.5	7.5	0.0		70.0
24	0	3	2	0	0	0	35	0.0	7.5	5.0	0.0		87.5
25	0	3	9*	1	1	0	26	0.0	7.5	22.5	2.5		65.0
26	1	2	10*	0	0	0	27	2.5	5.0	25.0	0.0		67.5
27	0	10*	14*	5	0	1	10	0.0	25.0	35.0	12.5	S	35.0
28	0	2	1	0	0	0	37	0.0	5.0	2.5	0.0		92.5
29	0	5	1	3	0	2	29	0.0	12.5	2.5	7.5		72.5
30	0	2	4	2	0	2	30	0.0	5.0	10.0	5.0		75.0

Table A-8
Data Summary Table 8, Time to Qualify

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 8: TIME TO QUALIFY
(Q8)

TASK	MEAN	Q	N	DISTRIBUTION OF SUPERVISOR EXPECTATIONS: NONE	0	Y+	3Y	Y	6M	3M	M	W	% NOT EXP IN 1ST YR	% EXP 3 MOS OR LESS
1	6.17	0.54	6	34	0	0	0	0	1	3	2	0	0.0	83.3
2	6.75	1.52	13	27	0	0	1	3	1	0	6	2	7.7	61.5
3	6.29	1.05	25	15	0	0	1	1	5	7	5	6	4.0	72.0
4	4.75	1.63	9	31	0	0	[illegible]	2	2	0	2	1	22.2	33.3
5	5.25	1.00	14	26	0	0	1	3	4	3	0	3	7.1	42.9
6	5.40	1.28	27	13	0	0	3	6	5	5	7	1	11.1	40.1
7	5.88	0.46	28	11	0	0	0	5	6	8	8	1	0.0	60.7
8	4.75	0.81	5	35	0	1	0	1	2	1	0	0	20.0	20.0
9	6.50	1.00	8	32	0	0	1	0	1	2	2	2	12.5	75.0
10	6.50	2.25	4	36	0	1	0	0	0	1	2	0	25.0	75.0
11	6.79	0.78	18	21	0	0	0	2	1	4	7	4	0.0	83.3
12	5.33	0.69	7	33	0	0	1	0	3	2	1	0	14.3	42.9
13	5.00	1.42	8	32	0	0	3	0	2	2	1	0	37.5	37.5
14	5.67	1.19	7	33	0	0	1	2	0	3	1	0	14.3	57.1
15	5.72	0.85	22	17	0	0	1	4	4	9	3	1	4.5	55.1
16	4.64	0.75	22	18	0	0	2	8	7	2	2	1	9.1	22.7
17	5.63	0.93	13	27	0	0	1	2	3	4	2	1	7.7	53.8
18	6.00	1.67	8	32	0	0	0	3	0	2	1	2	0.0	62.5
19	4.00	1.00	6	34	0	1	1	2	1	1	0	0	33.3	16.7
20	5.50	1.00	8	32	0	0	0	2	2	2	1	1	0.0	50.0
21	5.50	1.25	6	34	0	0	0	2	1	1	2	0	0.0	50.0
22	4.00	0.75	10	30	0	1	2	4	2	1	0	0	30.0	10.0
23	5.75	1.13	5	35	0	0	0	2	0	2	1	0	0.0	60.0
24	6.50	1.13	6	34	0	0	0	1	1	1	2	1	0.0	66.7
25	5.80	0.85	17	23	0	0	0	2	5	5	5	0	0.0	58.8
26	5.75	1.27	11	29	0	0	1	2	2	2	3	1	9.1	54.5
27	6.39	0.85	32	8	0	0	0	6	2	9	10	5	0.0	75.0
28	4.00	0.25	2	38	0	0	0	2	0	0	0	0	0.0	0.0
29	5.50	0.75	4	36	0	0	0	1	1	2	0	0	0.0	50.0
30	6.63	0.49	7	33	0	0	0	0	0	3	4	0	0.0	100.0

Table A-9
Data Summary Table 9, Supervisor Suggestions

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 9: SUPERVISOR
(Q9) SUGGESTIONS

TASK	POSSIBLE TO IMPROVE N	POSSIBLE TO IMPROVE %	DISTRIBUTION OF MEANS FOR IMPROVEMENT H	D	T	R	?	O	%T	MODE MO	MODE %
1	3	7.5	1	2	0	0	0	0	0.0	D	66.7
2	1	2.5	0	0	1	0	0	0	100.0	T	100.0
3	8	20.0*	2	1	4	0	1	0	50.0	T	50.0
4	1	2.5	0	0	0	0	1	0	0.0	?	100.0
5	2	5.0	0	0	1	0	1	0	50.0	T?	50.0
6	8	20.0*	0	5	1	1	1	0	12.5	D	62.5
7	15	37.5*	3	1	10	0	0	0	71.4	T	71.4
8	1	2.5	0	0	0	0	1	0	0.0	?	100.0
9	1	2.5	0	1	0	0	0	0	0.0	D	100.0
10	1	2.5	0	1	0	0	0	0	0.0	D	100.0
11	3	7.5	0	2	0	0	1	0	0.0	D	66.7
12	3	7.5	1	0	2	0	0	0	66.7	T	66.7
13	2	5.0	0	1	1	0	0	0	50.0	DT	50.0
14	1	2.5	0	1	0	0	0	0	0.0	D	100.0
15	3	7.5	2	0	0	0	1	0	0.0	H	66.7
16	12	30.0*	3	1	2	3	0	1	20.0	HR	30.0
17	2	5.0	0	1	1	0	0	0	50.0	DT	50.0
18	1	2.5	0	0	1	0	0	0	100.0	T	100.0
19	3	7.5	1	1	1	0	0	0	33.3	MM	0.0
20	2	5.0	1	0	0	1	0	0	0.0	HR	50.0
21	1	2.5	1	0	0	0	0	0	0.0	H	100.0
22	1	2.5	0	1	0	0	0	0	0.0	D	100.0
23	2	5.0	1	1	0	0	0	0	0.0	HD	50.0
24	1	2.5	0	0	1	0	0	0	100.0	T	100.0
25	3	7.5	3	0	0	0	0	0	0.0	H	100.0
26	0	0.0	0	0	0	0	0	0	0.0		67.5
27	12	30.0*	2	1	7	1	1	0	58.3	T	58.3
28	1	2.5	0	1	0	0	0	0	0.0	D	100.0
29	1	2.5	1	0	0	0	0	0	0.0	H	100.0
30	0	0.0	0	0	0	0	0	0	0.0		75.0

Table A-10
Data Summary Table 10, Frequency of Task Performance

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 10: FREQUENCY OF TASK PERFORMANCE
(Q10 & 11)

TASK	ACTUAL WORKER FREQUENCY MDN	Q	N	SUPERVISOR FREQUENCY DESIRE MDN	Q	N	D:W-S MDN	DISTRIBUTION OF WORKER FREQUENCY OF TASK PERFORMANCE NONE	0+	Y-	1Y	1M	1W	1D	D+	PERF <1Y %	PERF >=1W %	DISTRIBUTION OF SUPERVISOR DESIRES FOR TASK FREQUENCY NONE	0+	Y-	1Y	1M	1W	1D	D+	DES <1Y %	DES >=1W %
1	4.5	0.5	7	4.5	0.6	6	0.0	58	0	0	0	1	1	0	0	0.0	50.0	34	1	0	0	2	3	0	0	16.7	50.0
2	3.9	0.7	13	2.3	1.6	9	1.7	47	1	1	2	6	3	0	0	15.4	23.1	31	3	2	0	2	2	0	0	15.4	22.2
3	3.7	1.6	16	3.5	0.9	16	0.2	44	5	0	2	5	2	1	1	31.3	25.0	24	2	1	5	4	1	0	2	18.8	25.0
4	2.4	0.6	15	2.4	0.6	13	-0.0	45	2	6	6	1	0	0	0	53.3	0.0	27	0	7	4	2	0	0	0	53.3	0.0
5	3.4	0.6	20	3.5	0.7	20	-0.1	39	1	0	10	8	0	0	1	5.0	5.0	20	4	0	6	9	0	1	0	20.0	5.0
6	5.4	0.9	32	6.2	1.1	25	-0.8	26	0	0	1	7	9	8	7	0.0	75.0	15	0	0	0	5	4	5	11	0.0	80.0
7	4.1	0.6	36	4.3	0.6	24	-0.1	24	2	0	6	16	10	2	0	5.6	33.3	15	2	0	1	12	7	1	1	5.3	37.[illegible]
8	4.8	1.1	5	3.9	0.3	5	0.9	54	0	0	2	0	2	0	1	0.0	60.0	34	1	0	0	4	0	0	0	20.0	[illegible]
9	3.0	1.3	8	4.0	1.3	18	-1.0	52	3	0	2	3	0	0	0	37.5	0.0	22	3	2	0	8	2	0	3	22.5	27.5
10	6.2	0.4	3	6.7	0.8	8	-0.4	57	0	0	0	0	0	2	1	0.0	99.9	31	0	0	0	1	1	1	4	0.0	57.5
11	4.9	1.1	21	6.5	1.1	22	-1.6	39	2	0	2	4	6	4	3	9.5	61.9	17	2	0	0	2	4	3	11	9.1	51.[illegible]
12	3.0	0.5	9	3.8	0.7	10	-0.8	51	1	1	5	2	0	0	0	22.2	0.0	30	1	0	2	4	1	0	1	10.0	21.[illegible]
13	2.0	0.3	1	3.8	0.6	6	-1.8	59	0	1	0	0	0	0	0	99.9	0.0	34	1	0	1	4	0	0	0	16.7	[illegible]
14	3.3	1.3	7	3.9	0.3	6	-0.6	53	1	1	2	1	1	1	0	28.6	28.6	34	0	0	1	5	0	0	0	0.0	[illegible]
15	4.1	0.5	24	4.3	0.6	24	-0.2	36	1	1	2	13	6	0	1	8.3	29.2	16	0	2	1	11	8	2	1	8.3	41.7
16	3.9	0.6	31	4.0	1.0	28	-0.1	29	2	2	5	15	3	2	2	12.9	22.6	12	3	2	3	11	3	2	4	17.9	32.1
17	3.9	0.6	25	3.8	0.8	22	0.1	35	1	3	3	13	1	3	1	16.0	20.0	16	2	0	7	7	2	0	3	9.1	27.3
18	2.2	0.7	13	3.0	1.0	16	0.2	47	2	1	5	5	0	0	0	23.1	0.0	24	1	6	2	5	1	1	0	43.8	12.5
19	3.3	0.5	11	3.3	0.4	3	0.0	49	0	0	7	3	1	0	0	0.0	9.1	37	0	0	2	1	0	0	0	0.0	0.0
20	2.7	0.7	12	2.8	0.8	18	-0.1	48	2	3	5	2	0	0	0	41.7	0.0	21	4	2	10	2	0	0	0	33.3	0.0
21	3.3	0.6	5	3.6	0.6	9	-0.4	55	1	0	2	2	0	0	0	20.0	0.0	31	1	0	2	4	0	0	1	11.1	11.1
22	3.0	0.5	9	3.1	0.5	14	-0.1	51	2	0	5	2	0	0	0	22.2	0.0	26	1	1	9	2	1	0	1	14.[illegible]	14.3
23	3.0	1.8	3	2.1	0.4	12	0.9	57	0	1	1	0	0	1	0	33.3	33.3	28	2	7	2	1	0	0	0	71.0	0.0
24	0.0	0.0	0	1.8	0.6	5	-1.8	60	0	0	0	0	0	0	0	0.0	0.0	35	2	2	1	0	0	0	0	50.0	0.0
25	3.6	1.1	17	3.5	0.8	14	0.1	43	3	3	2	7	2	0	0	35.3	11.8	26	1	2	4	5	1	0	1	21.4	14.3
26	4.1	1.1	18	3.3	1.4	13	0.8	42	4	0	2	5	5	2	0	22.2	38.9	27	3	2	2	3	3	0	0	38.5	42.1
27	4.1	0.5	38	4.2	0.7	29	-0.2	22	4	0	4	19	7	1	1	10.5	28.9	10	1	1	3	13	7	2	2	6.9	37.9
28	4.0	1.3	3	5.0	1.8	3	-1.0	57	0	0	1	1	1	1	0	0.0	33.3	37	0	0	1	0	1	0	1	0.0	66.7
29	3.1	0.5	15	3.0	1.3	11	0.1	45	1	2	8	2	1	0	2	20.0	13.3	29	3	1	3	3	0	0	1	34.4	9.1
30	3.7	0.6	12	3.4	0.7	11	0.3	48	1	0	4	6	1	0	0	8.3	8.3	29	1	1	4	4	1	0	0	18.2	9.1

Table A-11
Data Summary Table 11, Task Importance

TASK INVENTORY DATA SUMMARY
SECRETARIES - COMPOSITE

TABLE 11: TASK IMPORTANCE
(Q12 & 13)

	RESPONDENTS CITING WORKER PERFORMANCE OF A TASK							ALL RESPONDENTS, INCLUDING NON-PERFORMANCE CITATIONS							DISTRIBUTION OF WORKER RESPONSES				DISTRIBUTION OF SUPERVISOR RESPONSES			
	WORKERS			SUPERVISORS			D:W-S	WORKERS			SUPERVISORS			D:W-S								
TASK	MEAN	SD	N	MEAN	SD	N	MEAN	MEAN	SD	N	MEAN	SD	N	MEAN	NONE	LOW	MED	HIGH	NONE	LOW	MED	HIGH
1	3.0	0.0	2	2.2	0.7	6	0.8	0.1	0.5	60	0.3	0.8	40	-0.2	58	0	0	2	34	1	3	2
2	2.2	0.8	13	2.3	0.6	13	-0.1	0.5	1.0	60	0.8	1.1	40	-0.3	47	3	4	6	27	1	7	5
3	2.3	0.7	16	2.2	0.7	25	0.2	0.6	1.1	60	1.3	1.2	40	-0.7	44	2	7	7	15	5	11	9
4	1.4	0.5	15	1.7	0.7	9	-0.3	0.3	0.7	60	0.4	0.8	40	-0.0	45	9	6	0	31	4	4	1
5	2.0	0.7	21	2.4	0.6	14	-0.3	0.7	1.1	60	0.8	1.2	40	-0.1	39	5	10	6	26	1	7	6
6	2.7	0.4	32	2.7	0.5	26	-0.0	1.5	1.4	58	1.8	1.4	39	-0.3	26	0	9	23	13	1	5	20
7	2.5	0.5	36	2.7	0.5	29	-0.2	1.5	1.3	60	1.9	1.3	40	-0.4	24	0	19	17	11	0	10	19
8	2.7	0.5	6	2.6	0.5	5	0.1	0.3	0.8	60	0.3	0.9	40	-0.1	54	0	2	4	35	0	2	3
9	2.1	0.9	8	2.3	0.7	8	-0.1	0.3	0.8	60	0.4	0.9	40	-0.2	52	3	1	4	32	1	4	3
10	3.0	0.0	3	2.3	0.8	4	0.8	0.1	0.7	60	0.2	0.7	40	-0.1	57	0	0	3	36	1	1	2
11	1.8	0.8	19	2.4	0.8	19	-0.6	0.6	0.9	58	1.1	1.3	40	-0.5	39	8	7	4	21	4	4	11
12	2.0	0.5	9	2.1	0.6	7	-0.1	0.3	0.7	60	0.4	0.9	40	-0.1	51	1	7	1	33	1	4	2
13	1.0	0.0	1	2.6	0.7	8	-1.6	0.0	0.1	60	0.5	1.1	40	-0.5	59	1	0	0	32	1	1	6
14	2.4	0.7	7	2.9	0.3	7	-0.4	0.3	0.8	60	0.5	1.1	40	-0.2	53	1	2	4	33	0	1	6
15	2.0	0.6	24	2.3	0.5	23	-0.3	0.8	1.1	60	1.3	1.2	40	-0.5	36	4	15	5	17	0	15	8
16	2.4	0.7	30	2.6	0.5	22	-0.2	1.2	1.3	59	1.4	1.3	40	-0.2	29	4	11	15	18	0	9	13
17	2.2	0.6	25	2.5	0.6	13	-0.3	0.9	1.2	60	0.8	1.2	40	0.1	35	3	13	9	27	1	4	8
18	2.0	0.6	13	2.3	0.7	8	-0.3	0.4	0.9	60	0.4	0.9	40	-0.0	47	2	9	2	32	1	4	3
19	2.6	0.5	11	2.7	0.5	6	-0.0	0.5	1.0	60	0.4	1.0	40	0.1	49	0	4	7	34	0	2	4
20	2.2	0.6	11	2.5	0.5	8	-0.3	0.4	0.9	59	0.5	1.0	40	-0.1	48	1	7	3	32	0	4	4
21	3.0	0.0	4	2.5	0.5	6	0.5	0.2	0.8	59	0.4	0.9	40	-0.2	55	0	0	4	34	0	3	3
22	2.4	0.5	8	2.1	0.7	10	0.3	0.3	0.8	59	0.5	1.0	40	-0.2	51	0	5	3	30	2	5	3
23	2.3	0.5	3	2.2	0.4	5	0.1	0.1	0.5	60	0.3	0.7	40	-0.2	57	0	2	1	35	0	4	1
24	0.0	0.0	0	2.8	0.4	6	-2.8	0.0	0.0	60	0.4	1.0	40	-0.4	60	0	0	0	34	0	1	5
25	2.0	0.6	17	2.1	0.6	17	-0.1	0.6	1.0	60	0.9	1.1	40	-0.3	43	3	11	3	23	3	10	4
26	1.8	0.5	17	2.0	0.7	11	-0.2	0.5	0.9	59	0.5	1.0	40	-0.0	42	5	11	1	29	3	5	3
27	2.5	0.5	37	2.6	0.5	32	-0.1	1.6	1.3	59	2.1	1.2	40	-0.5	22	1	15	21	8	1	10	21
28	1.7	0.9	3	2.0	1.0	2	-0.3	0.1	0.4	60	0.1	0.5	40	-0.0	57	2	0	1	38	1	0	1
29	2.1	0.5	14	1.8	0.8	4	0.3	0.5	0.9	59	0.2	0.6	40	0.3	45	1	11	2	36	2	1	1
30	1.7	0.6	12	1.3	0.7	7	0.4	0.3	0.7	60	0.2	0.6	40	0.1	48	5	6	1	33	6	0	1

LEVEL

Program LEVEL reads the Summary Value file, and selects or rejects tasks as relevant based on four selection rules, as described in Volume 4. In addition, the program will calculate a weighted linear combination of two summary values as a "predicted task development level" (see Volume 4).

Minimum values for task selection on relevance questions as well as variables and weights to be used in the prediction equations are variable, and are supplied as input parameters to the program. Deck set-up for executing LEVEL is:

1. System Control Cards.

2. LEVEL Source deck.

3. Parameter Card:

col	1-4	Minimum value on Q1, (in percent) for selection as relevant. (Rule 1, Volume 4, suggests 10%)
col	5-8	Minimum value on Q2, (in percent) for selection as relevant. (Rule 2, Volume 4, suggests 15%)
col	9-12	Minimum value for Q3, (as a scale value) for selection as relevant. (Rule 3, Volume 4, suggests .75)
col	13-16	Minimum value for Q4, (as a scale value) for selection as relevant. (Rule 4, Volume 4, suggests .75)

Note: Use zero entries in columns 1-4, 5-8, 9-12, or 13-16 to indicate that data were not obtained on Questions 1, 2, 3, or 4, respectively.

col	17	blank
col	18	Are $\bar{y}$-values (i.e., development levels) to be calculated? 0 = No 1 = Yes
col	19	blank
col	20-23	Minimum $\bar{y}$-value for selection. (Stage 3, Volume 4, suggests 3.1)
col	24	blank
col	25	First variable to be used in prediction equation: 1 = Q3:$\bar{X}$ 2 = Q4:$\bar{X}$ 3 = Q6:T% 4 = Q7:T% 5 = Q13:$\bar{X}$
col	26-29	Coefficient (weight) for first variable.
col	30	blank
col	31	Second variable to be used in prediction equation. (Same codes as above)
col	32-35	Coefficient (weight) for second variable.
col	36	blank
col	37-40	Constant (intercept) to be used in prediction equation.

Input parameters are in F-format; decimals may be punched anywhere in the field. If no decimal point is punched, input is assumed to be in whole numbers.

The program rejects a task for relevance if summary values for *any two* of the four questions (1 through 4) fall below the corresponding user-supplied minimums (or any two of the four for which data is present). In addition, the program also rejects tasks for training if the $\bar{y}$-value for the task is less than the minimum $\bar{y}$-value input to the program. (This is identified as Rule 5 on output.)

The program will run in approximately 30K, and prints one report for each dataset on the Summary Value file. The Summary Value file is assumed resident on logical unit 1.

```
C     PROGRAM LEVEL

      DIMENSION KOL(53),COL(50),KH(17),TITLE(10),ISUB(5),A(10),X(4),Z(9)
      DATA ISUB/17,47,35,40,9/,A/1H1,1H2,1H3,1H4,1H5,1H,,3HSEL,3HREJ,
     *3HFCT,1H /,Z/9*1H /,Y/0./
      READ(5,90)X,IX,YMIN,IV1,WGT1,IV2,WGT2,CONST
    1 READ(1,END=55)TITLE,NT
      WRITE(6,110)TITLE
      IF(IV1.LT.1.OR.IV2.LT.1)GO TO 5
      I1=ISUB(IV1)
      I2=ISUB(IV2)
    5 LIMIT=1
      DO 80 I=1,NT,5
      K=I+4
      L=MIN0(NT,K)
      IF(I.NE.LIMIT)GO TO 20
      IF(I.EQ.1)LIMIT=LIMIT+30
      IF(I.EQ.1)GO TO 10
      IF(I.GT.1)LIMIT=LIMIT+35
      WRITE(6,120)
   10 WRITE(6,130)
   20 DO 75 J=I,L
      KNT=0
      READ(1)KOL,COL,KH
      IF(COL(1).LT.X(1).AND.X(1).NE.0.)GO TO 25
      GO TO 30
   25 KNT=KNT+1
      Z(1)=A(1)
   30 IF(COL(5).LT.X(2).AND.X(2).NE.0.)GO TO 35
      GO TO 40
   35 KNT=KNT+1
      MSUB=2*(KNT-1)+1
      IF(KNT.GT.1)Z(MSUB-1)=A(6)
      Z(MSUB)=A(2)
   40 IF(COL(17).LT.X(3).AND.X(3).NE.0.)GO TO 45
      GO TO 50
   45 KNT=KNT+1
      MSUB=2*(KNT-1)+1
      IF(KNT.GT.1)Z(MSUB)=A(6)
      IF(KNT.GT.1)Z(MSUB-1)=A(6)
      Z(MSUB)=A(3)
   50 IF(COL(47).LT.X(4).AND.X(4).NE.0.)GO TO 55
      GO TO 60
   55 KNT=KNT+1
      MSUB=2*(KNT-1)+1
      IF(KNT.GT.1)Z(MSUB-1)=A(6)
      Z(MSUB)=A(4)
   60 XDEC=A(7)
      IF(KNT.GE.2)XDEC=A(8)
      IF(IY.EQ.0)GO TO 80
      Y=WGT1*COL(I1)+WGT2*COL(I2)+CONST
      IF(Y.GE.YMIN)GO TO 65
      XDEC=A(9)
      KNT=KNT+1
      MSUB=2*(KNT-1)+1
```

```
      IF(KNT.GT.1)Z(MSUB-1)=A(6)
      Z(MSUB)=A(5)
   65 WRITE(6,140)J,XDEC,A(9),Z,Y
      DO 70 II=1,9
   70 Z(II)=A(10)
   75 CONTINUE
      WRITE(6,150)
   80 CONTINUE
      GO TO 1
   85 STOP
   90 FORMAT(4F4.0,1X,I1,1X,F4.0,I2,F4.0,I2,F4.0,1X,F4.0)
  110 FORMAT(1H1///52X,'TASK  INVENTORY  DATA  SUMMARY'/47X,10A4//52X,
     *30(1H-)/53X,'TASK RELEVENCE  AND LEVEL OF'/61X,'DEVELOPMENT'/
     *52X,30(1H-)/)
  120 FORMAT(1H1////)
  130 FORMAT(///49X,'INCLUSION',16X,'RULE(S)',14X,'Y-VALUE'/30X,'TASK',
     *14X,'(RELEVENCE)',14X,'APPLYING',14X,'(LEVEL)'/30X,4(1H-),14X,
     *11(1H-),14X,8(1H-),14X,7(1H-)/)
  140 FORMAT(31X,I3,17X,2A3,16X,9A1,12X,F7.2)
  150 FORMAT(1H0)
      END
```

Table A-12
Example of Output from Program LEVEL

TASK RELEVENCE AND LEVEL OF DEVELOPMENT

TASK	INCLUSION (RELEVENCE)	RULE(S) APPLYING	Y-VALUE (LEVEL)
1	REJECT	1,3,5	1.94
2	SELECT		3.27
3	REJECT	5	2.79
4	REJECT	5	2.50
5	REJECT	5	2.57
6	SELECT		3.72
7	SELECT		4.65
8	REJECT	2,3,5	2.79
9	REJECT	5	2.45
10	REJECT	1,3,5	2.29
11	SELECT		3.58
12	SELECT		3.47
13	REJECT	1,3,5	2.30
14	REJECT	3,5	2.46
15	SELECT		3.22
16	SELECT		3.87
17	SELECT		3.89
18	SELECT		3.84
19	REJECT	2,3,5	3.02
20	REJECT	5	2.88
21	REJECT	1,3,5	2.31
22	REJECT	3,5	2.57
23	SELECT	1	3.39
24	REJECT	1,2,3,4,5	2.45
25	REJECT	4,5	2.78
26	SELECT	4	3.16
27	SELECT		4.06
28	REJECT	1,2,3,4,5	2.58
29	REJECT	5	2.41
30	REJECT	5	2.51

TECHNICAL APPENDIX B
SUMMARIES OF ANALYSES USED TO ESTABLISH THE TASK SELECTION VARIABLES

Both factor and regression analyses were used in establishing what minimal amount of task information could be used effectively in making curriculum content decisions. Presented here is a summary of those analyses. Actual procedures recommended in Volume 4 were selected from these results.

The task data bases for these analyses were published in earlier reports (Ammerman & Pratzner, 1974, 1975; Ammerman, Pratzner, & Burgin, 1975). In referring to those data, it should be noted that the identification numbers for each task question have been altered for this report. The question numbers used in this Volume 5 correspond to their usage in Volumes 3 and 4.

Data for three occupations (Automotive Mechanics, Business Data Programmers, and General Secretaries) were used to provide replications of analyses over diverse occupations. This replication was necessary to secure reasonable assurance of the occupational generalizability of final results to be recommended in Volume 4.

Criterion data for 130 tasks in each occupation were obtained by use of the "expected level of task development" scale of the Employer Expectation Questionnaire (EEQ), as illustrated in Appendix B of Volume 4. A comparable scale of "intended levels of task development" was used in a Curriculum Content Questionnaire (CCQ), administered to curriculum managers of long-standing successful postsecondary programs in accredited institutions.

FACTOR ANALYSIS

The primary purpose of the planned factor analysis was to reduce the original Task Inventory Questionnaire (TIQ) variables to a representative number that could subsequently serve as the predictor variables for a series of stepwise regression analyses. That is, the problem was essentially that of determining which of the TIQ variables would best predict the CCQ and EEQ data which served as measures of criterion training content. While that could be answered using just regression

analyses, the very large number of TIQ variables suggested that the TIQ variables should first be reduced through a factor analysis. The criteria were also included in the factor analysis in order to suggest which variables would best predict the criteria, helpful information for subsequent regression analyses.

Variable selection. The following TIQ variables were selected from the Task Inventory Systems program (see Technical Appendix A) for factor analysis:

Variable No.	TIQ Question and Type of Summary Value	
1.	Q 1:% performing, Actual Task Occurrence (workers)	
2.	Q 2:% desiring performance, Desired Task Occurrence (supervisors)	
3.	Q12:$\bar{X}$, Task Importance to Job (by workers performing)	
4.	Q13:$\bar{X}$, Task Importance to Job (by supervisors desiring performance)	
5.	Q12:$\bar{X}$, Task Importance to Job (by all workers)	
6.	Q13:$\bar{X}$, Task Importance to Job (by all supervisors)	
7.	Q 3:$\bar{X}$ significance, Extent Task Is Part of the Position (by all workers)	
8.	Q 3:% rating $\geq$ 1 significance	
9.	Q 3:% rating $\geq$ 4 significance	
10.	Q10:MDN, Actual Frequency of Performance (by workers performing)	
11.	Q11:MDN, Desired Frequency of Performance (by supervisors desiring performance)	
12.	Q 8:MDN, Time to Qualify (by supervisors desiring performance)	
13.	Q 8:% rating > 1 year to qualify (by all supervisors)	
14.	Q 8:% rating $\leq$ 3 months to qualify (by all supervisors)	
15.	Q 9:% checking, Possible to Improve Procedures (supervisors)	
16.	Q14:% checking, Poorly Performed Task (supervisors)	
17.	Q6A:% citing PRIOR to training	Learning Location (workers)
18.	Q6A:% citing formal TRAINING program	
19.	Q6A:% citing on-job SITE	
20.	Q6A:% citing prior EXPERIENCE	
21.	Q6A:% citing NOTHING to learn	
22.	Q 7:% citing PRIOR to training	Learning Location (supervisors)
23.	Q 7:% citing formal TRAINING program	
24.	Q 7:% citing on-job SITE	
25.	Q 7:% citing prior EXPERIENCE	
26.	Q 7:% citing NOTHING to learn	
27.	Q 9:% citing HANDBOOK	Ways to Improve Procedures (supervisors)
28.	Q 9:% citing DIRECTIVES	
29.	Q 9:% citing TRAINING content	
30.	Q 9:% citing RESEARCH	
31.	Q 9:% citing Don't Know How	
32.	Q9A:% citing lack of INTEREST	Reasons for Poor Performance of Task (supervisors)
33.	Q9A:% citing TRAINING	
34.	Q9A:% citing More Important MATTERS	
35.	Q9A:% citing DIFFICULT to learn	
36.	Q9A:% citing Don't Know Why	

In addition, mean scores for each task were calculated for Q10, Q11, and Q8 based on (a) the number of workers or supervisors who actually rated each task, and on (b) the overall total number

of workers or supervisors who could have responded, i.e., those who actually did rate the task plus the remaining workers and supervisors who did not respond to the tasks under Q10, Q11, and Q8 instructions because the tasks were not performed on their job. The means calculated in (a) and (b) above, for Q10, Q11, and Q8 were included in the planned factor analysis to determine if median or mean summary values for each task would best define resulting factors. In addition, including both types of means would permit a comparison of their relative stability across occupations. It was felt that means based on the total subject sample would be more stable. Finally, means based on the total subject sample would also be more representative of the actual worker and supervisor population within the three occupations included in the study; and, it was felt that the mean value for each task rated under Q10, Q11, and Q8 should be based on the overall subject sample to permit task-to-task comparison, a comparison which would be difficult using respondent only means since it was theoretically possible for each task to be rated by a different proportion of the overall sample. The overall means and the respondent based means were included in the factor analysis as the following variables:

37. Q10:$\overline{X}$, Actual Frequency of Performance (by all workers)
38. Q10:$\overline{X}$, Actual Frequency of Performance (by workers performing)
39. Q11:$\overline{X}$, Desired Frequency of Performance (by all supervisors)
40. Q11:$\overline{X}$, Desired Frequency of Performance (by supervisors desiring performance)
41. Q 8:$\overline{X}$, Time to Qualify (by all supervisors)
42. Q 8:$\overline{X}$, Time to Qualify (by supervisors desiring performance)

Two additional measures from earlier studies were also available for many tasks, being included in the analysis as variables 43 and 44:

43. TTE:$\overline{X}$, Task Training Emphasis (by all instructors)
44. Q 5:$\overline{X}$, Relative Percent of Time Spent (by all workers)

The following variables represented the criteria by which to validate the TIQ variables and therefore were included in the factor analysis:

45. CCQ:$\overline{X}$, Intended Task Development (by all curriculum managers)
46. CCQ:% rating $\geq$ 1 level of development
47. CCQ:% rating $\geq$ 4 level of development
48. EEQ:$\overline{X}$, Expected Task Development (by all employers)
49. EEQ:% rating $\geq$ 1 level of development
50. EEQ:% rating $\geq$ 4 level of development

Number of factors. A 50 x 50 variable correlation matrix was calculated for each occupation. Communality estimates consisted of the element of the largest, absolute magnitude in each row of the correlation matrix. To determine the number of factors to be rotated, a preliminary factor analysis was performed and the amount of variance accounted for by each of the first eight factors was determined and plotted. These results are presented in Figure B-1. Using the graph, a Scree test for the number of factors (Cattell, 1966) suggested that 4, 5, or 6 factors would best represent the variable structure for all three occupations. Therefore, a 4-, 5-, or 6 factor analytic solution was determined for each of the three occupations and, in turn, each of the three solutions were rotated to both an orthogonal (Varimax) and an oblique (Binormamin) factor structure. There were no interpretive differences between the orthogonal and oblique factor rotations for any of the occupations. Therefore, the 4-, 5-, and 6 factor orthogonal solutions were selected for further examination since they did not require an interpretation of factor intercorrelations. The 4 factor solution provided the most meaningful interpretation of the variables for all occupations and was retained for further examination. Tables B-1, B-2, and B-3 present the factor loadings for Mechanics, Programmers, and Secretaries, respectively.

Figure B-1
Scree graphs for three occupations

Table B-1
Auto Mechanics Factor Loadings

Factor	Variance	Percent Variance	Cumulative Percent
1	20.51	60.43	60.43
2	5.63	16.58	77.01
3	4.23	12.47	89.48
4	3.57	10.52	99.99

Orthogonally Rotated Factor Matrix

1	.95	.19	.02	.05
2	.96	.15	.11	.05
3	.29	-.21	.22	.24
4	.67	-.29	.23	.35
5	.96	.09	.06	.10
6	.95	.04	.13	.14
7	.95	.16	.13	.05
8	.95	.20	.00	.09
9	.94	.17	.16	.05
10	.32	.15	.78	.10
11	.20	.23	.86	.04
12	.69	.65	.11	-.22
13	-.79	-.41	-.04	.13
14	.61	.68	.06	-.23
15	.51	-.08	.21	.67
16	.05	.19	.15	.85
17	-.06	.62	.17	-.21
18	.62	-.54	-.38	.23
19	.07	.69	.24	-.25
20	-.52	.36	.26	-.01
21	-.89	.03	.30	-.09
22	.28	.70	.07	-.25
23	.86	-.38	-.15	.09
24	.38	.64	.12	-.09
25	-.02	.40	.26	.16
26	.02	.61	.56	-.08
27	.08	.30	.11	.12
28	-.14	.17	.15	.14
29	.65	-.23	.15	.50
30	.08	-.22	-.02	.59
31	-.15	.08	.23	.03
32	.09	.44	.11	.17
33	.09	-.10	.03	.71
34	-.14	.12	.25	.05
35	-.03	-.04	.02	.69
36	.14	.04	.11	.03
37	.84	.24	.35	.05
38	.22	.19	.84	.02
39	.83	.25	.41	.06
40	.22	.23	.87	.02
41	.87	.42	.09	-.11
42	.73	.61	.07	-.18
43	.76	-.14	.31	.22
44	.81	.16	.05	.01
45	.94	-.01	.16	.01
46	.87	.01	.01	.12
47	.92	-.04	.18	.02
48	.92	.12	-.06	.02
49	.82	.17	0.04	.11
50	.93	.13	-.05	.01

Table B-2
Business Data Programmers Factor Loadings

Factor	Variance	Percent Variance	Cumulative Percent
1	16.85	56.75	56.75
2	5.53	18.62	75.37
3	3.97	13.39	88.75
4	3.34	11.25	99.99

Orthogonally Rotated Factor Matrix

1	.30	.20	.01	.19
2	.34	-.15	.23	.32
3	.47	-.23	.29	-.02
4	.73	-.00	.19	-.01
5	.93	.09	.04	.15
6	.88	-.14	.18	.23
7	.94	.01	.01	.17
8	.89	.02	.14	.21
9	.91	-.01	-.03	.14
10	.57	.43	.19	-.02
11	.45	.66	.05	-.06
12	.35	.84	-.23	.05
13	-.43	-.69	.15	-.08
14	.35	.80	-.26	.03
15	.43	-.50	.11	.44
16	.24	-.07	.02	.87
17	-.09	.07	.02	.02
18	.46	.19	-.79	.06
19	.14	-.28	.76	.03
20	.01	-.18	.58	.15
21	-.86	.07	.10	-.19
22	.31	.09	-.11	.18
23	.75	.03	-.52	.19
24	.24	-.16	.74	.25
25	.17	-.20	.63	.01
26	-.04	.12	.40	.15
27	.02	-.06	.20	.44
28	.30	.00	.20	.25
29	.36	-.47	-.22	.25
30	.12	-.45	.13	.12
31	.14	-.29	.20	-.02
32	.18	.18	.04	.75
33	.22	-.21	-.22	.28
34	.07	-.04	.08	.63
35	.05	-.26	.12	.21
36	.16	-.07	.08	.38
37	.89	.28	.00	.12
38	.56	.51	.13	.05
39	.87	.20	.12	.26
40	.50	.67	-.04	-.01
41	.86	.18	.03	.24
42	.40	.82	-.22	.05
43	.80	.08	.15	.25
44	.47	-.03	-.24	.11
45	.80	.28	.10	.13
46	.59	.15	.34	.12
47	.78	.25	.13	.10
48	.83	.14	-.16	.05
49	.64	.03	-.10	.08
50	.79	.24	-.18	.01

Table B-3
General Secretaries Factor Loadings

Factor	Variance	Percent Variance	Cumulative Percent
1	13.37	45.22	45.22
2	6.70	22.64	67.87
3	5.15	17.40	85.27
4	4.36	14.73	99.99

Orthogonally Rotated Factor Matrix

1	.39	.24	.21	.16
2	.38	.20	.30	.23
3	-.09	.57	.12	-.01
4	.12	.48	.19	.03
5	.82	.38	.23	.15
6	.30	.33	.32	.25
7	.80	.38	.27	.24
8	.80	.25	.30	.29
9	.75	.42	.25	.21
10	.62	.57	-.15	.04
11	.65	.51	-.09	.12
12	.69	.02	-.18	.34
13	-.38	-.03	.11	.30
14	.64	.01	-.24	-.39
15	.09	.10	.78	.02
16	.09	.17	.76	.01
17	.56	.01	.19	-.51
18	.04	.38	.49	-.65
19	-.09	-.09	-.26	.82
20	.30	.74	.07	.54
21	-.33	-.46	-.54	-.01
22	.76	.13	.08	-.15
23	.51	.36	.54	-.39
24	.18	.00	-.13	.80
25	.35	.04	-.11	.50
26	.45	-.33	-.32	.17
27	.10	-.04	.40	.08
28	-.06	-.13	.23	.40
29	.09	.18	.72	-.20
30	-.04	.05	.25	.09
31	-.02	-.11	.20	.24
32	.16	.21	.34	.20
33	-.01	.17	.61	-.20
34	.11	-.07	.18	.28
35	-.04	.39	.53	.00
36	.08	.69	.08	-.07
37	.87	.36	.10	.14
38	.61	.59	-.14	.06
39	.86	.35	.18	.16
40	.66	.52	-.10	.14
41	.93	.16	.15	.12
42	.74	.03	-.29	-.41
43	.48	.57	.38	-.12
44	.53	.24	.09	.00
45	.47	.70	.07	-.27
46	.35	.60	-.04	-.17
47	.41	.68	.02	-.25
48	.31	.76	.36	-.14
49	.26	.59	.21	.03
50	.35	.72	.24	-.07

Following examination of the 4-factor solution for each of the three occupations, a majority of the variables were eliminated from further analysis. The factor analyses were very similar across all occupations and therefore the following reasons for variable elimination were applicable to all three occupations:

1. In general, variables using values based on a calculation of the mean were more stable across the three occupations when compared to corresponding variables based on the median. Therefore, all median-based variables (variables 10, 11, and 12) were dropped and the corresponding mean-based variables (variables 37, 39, and 41) were retained.

2. In general, task mean values based on the entire sample of subjects rather than on only those who responded to a particular task were more stable across occupations, loaded higher on a given factor, and correlated higher with the criteria. Therefore, all variables with respondent-only mean values (variables 3, 4, 38, 40, and 42) were eliminated and the variables with mean values based on the total subject sample (variables 5, 6, 37, 39, and 41) were retained.

3. Variables 8, 9, 46, 47, 49, and 50 indicated the percentage of the total subject sample that responded to specified portions of the Q3 task significance scale, the CCQ rating scale, and the EEQ rating scale. Variables 7, 45, and 48, which indicated mean rating across all intervals of the same three scales, generally loaded higher on a given factor when compared to the variables representing portions of a scale. Since there was a high intercorrelation among and between variables representing a portion of a scale and variables representing the entire scale, variables 8, 9, 46, 47, 49, and 50 were eliminated from further analyses.

4. Variable 13 had a high negative correlation with variable 15 and the criteria. Since variable 13 and 14 both derived from the same TIQ question, variable 13 was eliminated as redundant.

5. Variables 16, 17, 20-22, 25-28, 30, 31, and 36 each had either a low or negative relationship with the criteria, as determined by factor loadings, and were therefore eliminated.

6. Variable 44, Relative Time Spent, was eliminated from further consideration since data for a large number of tasks in all three occupations were not available.

7. Variable 43, Task Training Emphasis, represented the "typical" training programs and was included in the factor analysis for interested only, to see how this data related to the present TIQ variables and the criteria. It was eliminated from further consideration.

Overall, the factor analyses permitted the elimination of 23 TIQ variables and four criterion measures. Table B-4 reports the remaining 19 TIQ variables and the two criteria. These data formed the basis for the regression analysis. Note that the variable identifications have been renumbered from those used in the factor analysis.

Table B-4
Predictor and Criterion Variables for Regression Analyses

Variable No.	TIQ Question and Type of Summary Value
1.	Q 1:% performing, Actual Task Occurrence (workers)
2.	Q 2:% desiring performance, Desired Task Occurrence (supervisors)
3.	Q12:$\bar{X}$, Task Importance to Job (by all workers)
4.	Q13:$\bar{X}$, Task Importance to Job (by all supervisors)
5.	Q 3:$\bar{X}$ significance, Extent Task Is Part of the Position (by all workers)
6.	Q 8:% rating $\leq$ 3 months to qualify, Time to Qualify (by all supervisors)
7.	Q 9:% checking Possible to Improve Procedures (supervisors)
8.	Q6A:% citing formal TRAINING program, Learning Location (workers)
9.	Q6A:% citing on-job SITE, Learning Location (workers)
10.	Q 7:% citing formal TRAINING program, Learning Location (supervisors)
11.	Q 7:% citing on-job SITE, Learning Location (supervisors)
12.	Q 9:% citing TRAINING content, Ways to Improve Procedures (supervisors)
13.	Q9A:% citing lack of INTEREST — Reasons for Poorly Performed Task (supervisors)
14.	Q9A:% citing TRAINING — Reasons for Poorly Performed Task (supervisors)
15.	Q9A:% citing More Important MATTERS — Reasons for Poorly Performed Task (supervisors)
16.	Q9A:% citing DIFFICULT to Learn — Reasons for Poorly Performed Task (supervisors)
17.	Q10:$\bar{X}$, Actual Frequency of Performance (by all workers)
18.	Q11:$\bar{X}$, Desired Frequency of Performance (by all workers)
19.	Q 8:$\bar{X}$, Time to Qualify (by all supervisors)
20.	CCQ:$\bar{X}$, Intended Task Development (by all curriculum managers)
21.	EEQ:$\bar{X}$, Expected Task Development (by all employers)

REGRESSION ANALYSES

The primary purpose of the regression analyses was to identify the minimum number of (a) worker, (b) supervisor, and (c) combinations of worker and supervisor variables within the 19 TIQ variables which would significantly predict the criteria. Further, since generalizability of the findings was highly desirable, the resulting predictor variable sets had to represent those variables which were significant for all three occupations, not one or two. While all the TIQ variables were a priori selected to identify occupational tasks which should be trained for, most of the TIQ variables were expected to be positively related to the criteria. Therefore, it was decided not to accept any predictor variable combinations containing variables that were positively related to the criteria but which nevertheless negatively predicted any of the criteria, a mathematically possible outcome when any one predictor variable suppresses another predictor variable in a regression equation (Nunnally, 1967, p. 162).

Overall multiple regression. As a preliminary step to identifying the minimum number of TIQ variables which would significantly predict the criteria across all occupations, a regression analysis using all 19 variables and two criteria was accomplished for each occupation. These results are presented in Table B-5 and represent the multiple correlation for each occupation, using only occupation-specific data. They are presented here for two reasons: (a) to index the predictive limits of the present data, and (b) to permit comparisons with subsequently presented multiple correlations between the most generalizable worker, supervisor, and worker-supervisor variables and criteria.

Table B-5
Multiple Correlations of 19 Variables with CCQ and EEQ for Three Occupations

Criteria	Mechanics	Programmers	Secretaries
CCQ:$\overline{X}$	.94	.81	.78
EEQ:$\overline{X}$	.93	.81	.82

Note. All coefficients are significant at $p < .001$.

Averaging predictors and criteria. To identify those variables that significantly predicted the criteria for all three occupations, a 22 x 22 averaged, covariance matrix was first calculated as follows: For each occupation a 21 x 21 covariance matrix (19 TIQ variables and 2 criteria) was calculated and then an average of the three matrices was obtained. In addition, the average covariance of the CCQ data from all three occupations was summed with the average EEQ data from all three occupations and then divided by two; i.e., the average covariance across both types of criteria was obtained. The resulting data was augmented to the 21 x 21 averaged, covariance matrix to form a 22 x 22 matrix of 19 predictors and 3 criteria. The 22 x 22 averaged, covariance matrix was next scaled to a correlation matrix and formed the data matrix for all subsequent regression analyses.

Identifying significant predictors. Using the previously derived 4-factor factor analyses as reference, a series of predictor variable combinations were selected from within worker, or supervisor, or worker-supervisor sets of variables which appeared to best define factors on which the criteria loaded highly. The factor analyses from all three occupations were used as reference. Selected variable sets contained as many as seven variables and as few as two variables. A total of 25 combinations of variables, including four worker variable combinations, six supervisor variable combinations, and fifteen worker-supervisor variable combinations were identified as potentially significant predictors of the CCQ, EEQ, and an average of both the CCQ and EEQ.

The 25 different sets of TIQ variables were separately identified within the 22 x 22 correlation matrix and, together with the three criteria, were each entered into a step-wise regression analysis; i.e., a total of 25 step-wise regression analyses were performed. The results were examined and, in all instances, the multiple correlations were highly significant. However, none of the step-wise regression analyses entered more than three TIQ variables, regardless of the number of predictors, suggesting a maximum of three variables within the present data is necessary to identify tasks which should receive training consideration. Moreoever, there was little practical difference between the multiple correlations based on two-variable predictor sets when compared to multiple correlations based on the three-variable predictor sets.

The 25 step-wise regression analyses identified a total of eight predictor variable sets in which each variable entered the multiple regression equation at a significant level. Table B-6 reports these eight sets of variables.

Validation of beta weights. While the multiple correlations based on averaged data were highly significant, the question remained: When the *standardized* beta weights that were derived from the averaged data were placed in a regression equation using data specific to each of the three occupations, would the multiple correlation be significant? In other words, averaged beta weight ratios

Table B-6
Multiple Correlations of Averaged Predictor Variables with Averaged Criteria

Occupationally-Averaged Criteria	Occupationally-Averaged Predictor Variables							
	Supervisors Only		Workers Only	Worker and Supervisor Data Combinations				
	4. Q13:$\bar{X}$ 10. Q 7:%T	4. Q13:$\bar{X}$ 10. Q 7:%T 18. Q11:$\bar{X}$	5. Q 3:$\bar{X}$ 8. Q6A:%T	5. Q 3:$\bar{X}$ 10. Q 7:%T	4. Q13:$\bar{X}$ 8. Q6A:%T 17. Q10:$\bar{X}$	5. Q 3:$\bar{X}$ 6. Q 8:% 10. Q 7:%T	5. Q 3:$\bar{X}$ 6. Q 8:% 8. Q6A:%T	5. Q 3:$\bar{X}$ 8. Q6A:%T 19. Q 8:$\bar{X}$
CCQ	.78	.79	.79	.78	.80[a]	.80[a]	.79	.79
EEQ	.76	.76	.80	.79	.79	.79	.81[a]	.81[a]
Average of CCQ and EEQ	.76	.77	.78	.79	.79	.79[a]	.79[a]	.79[a]

Note. All coefficients are significant at $p < .001$.

[a]Highest in row.

had been identified for each of the eight variable sets that should in turn, be the most generalizable ratios to all occupations. Therefore, these averaged standardized beta weight ratios were used to weight the present data for each occupation in order to validate the beta weights; i.e., to insure that, in fact, the averaged (and theoretically the most generalizable) beta weights would result in significant multiple correlation when applied to the present occupationally-specific data. (It should be noted, however, that the averaged beta weights are not independent from the occupationally-specific data.) The results are presented in Table B-7.

A comparison of Tables B-5, B-6, and B-7 permits several observations:

1. The multiple correlations in Table B-7 were derived using a maximum of three predictors and are weighted with standardized beta weights derived from an average of data across all occupations. By comparison, Table B-5 presents multiple correlations based on 19 predictors and were derived using the least-squares, best fit beta weights for each occupation. Nevertheless, the Table B-7 results are still highly significant. And, at least for Mechanics, there appears to be little practical difference between the Table B-5 and Table B-7 results.

2. Mechanics' criteria are predicted better than Programmers' and Secretaries' criteria, using the eight variable sets shown in Table B-7. (It should be noted here that this same ranking is obtained when the CCQ and EEQ interrater reliabilities are compared, suggesting that the reliability within the present criteria is a significant correlating factor in determining the present multiple correlations.)

Recommended standardized beta weights. Given the assumption that future data collections would be made using one or more of the variable sets suggested in Table B-7, data anlyses would be facilitated if the averaged, standardized beta weight ratios were not significantly different from equal weighting. This would permit a simple summing of *standardized* variables across each task without prior weighting calculations.

Table B-7
Multiple Correlations Using *Standardized* Beta Weight Ratios Derived from Averaged Data to Weight Occupationally-Specific Predictors

Occupationally-Specific Criteria	Occupationally-Specific Predictor Variables							
	Supervisors Only		Workers Only	Worker and Supervisor Data Combinations				
	4. Q13:$\overline{X}$ 10. Q 7:%T	4. Q13:$\overline{X}$ 10. Q 7:%T 18. Q11:$\overline{X}$	5. Q 3:$\overline{X}$ 8. Q6A:%T	5. Q 3:$\overline{X}$ 10. Q 7:%T	4. Q13:$\overline{X}$ 8. Q6A:%T 17. Q10:$\overline{X}$	5. Q 3:$\overline{X}$ 6. Q 8:% 10. Q 7:%T	5. Q 3:$\overline{X}$ 6. Q 8:% 8. Q6A:%T	5. Q 3:$\overline{X}$ 8. Q6A:%T 19. Q 8:$\overline{X}$
Mechanics:								
CCQ[a]	.92	.94[c]	.90	.92	.92	.92	.90	.91
EEQ[b]	.82	.84	.87	.86	.88	.88	.89[c]	.88
Programmers:								
CCQ[a]	.70	.74	.72	.73	.75	.76[c]	.74	.73
EEQ[b]	.72	.73	.77	.77	.76	.78[c]	.77	.78[c]
Secretaries:								
CCQ[a]	.64	.67	.67	.66	.67	.68	.69[c]	.68
EEQ[b]	.69	.69	.75[c]	.70	.70	.69	.74	.73

[a]Multiple correlations obtained using standardized beta weights derived from averaged predictors and averaged CCQs.

[b]Multiple correlations obtained using standardized beta weights derived from averaged predictors and averaged EEQs.

[c]Highest in row.

Therefore, multiple correlations were calculated for each of the eight averaged predictor and criteria sets, in which the predictors were given equal weighting. Then, following a procedure suggested by Overall and Klett (1977, p. 424), the differences between (a) multiple correlations based on the least squares, best fit procedure, and (b) multiple correlations based on the equal weighting of each predictor were determined. For four of the recommended predictor variable sets there was no significant difference. The averaged, standardized beta weights were examined for the remaining four and an attempt was made to determine the simplest weighting ratio among the beta weights. For each of the four sets of beta weights the simplest ratio was determined and multiple correlations were once again calculated using the newly determined beta weights. Subsequently, these were once again compared to the least squares, best fit multiple correlations. The results are presented in Table B-8. No significant differences were found.

Although rounding error has obscured the small differences between the Table B-5 and Table B-8 results, there were slight decreases in multiple correlations when the a priori beta weights were used in the regression equations to derive the Table B-8 results; however, none of the small differences reached a significant level. Therefore, any of the *standardized* beta weight ratios indicated in Table B-8 can be recommended for use with their associated predictor variable sets in any future data collections.

Table B-8
Multiple Correlations Using A Priori Determined Beta Weight Ratios
to Weight Occupationally-Averaged Predictors

Occupationally-Averaged Criteria	A Priori Ratios and Occupationally-Averaged Predictors							
	Supervisors Only		Workers Only	Worker and Supervisor Data Combinations				
	(1:1)	(1:1:1)	(2:1)	(2:1)	(1:1:1)	(4:1:2)	(4:1:2)	(1:1:1)
	4. Q13:$\bar{X}$ 10. Q 7:%T	4. Q13:$\bar{X}$ 10. Q 7:%T 18. Q11:$\bar{X}$	5. Q 3:$\bar{X}$ 8. Q6A:%T	5. Q 3:$\bar{X}$ 10. Q 7:%T	4. Q13:$\bar{X}$ 8. Q6A:%T 17. Q10:$\bar{X}$	5. Q 3:$\bar{X}$ 6. Q 8:% 10. Q 7:%T	5. Q 3:$\bar{X}$ 6. Q 8:% 8. Q6A:%T	5. Q 3:$\bar{X}$ 8. Q6A:%T 19. Q 8:$\bar{X}$
CCQ	.78	.79	.78	.78	.80	.79	.79	.79
EEQ	.76	.76	.80	.79	.79	.80	.81	.81
Average of CCQ and EEQ	.76	.77	.78	.78	.79	.79	.79	.79

Task selection ratios. The procedures described so far will permit the derivation of a single, standard score for each task that is rated on any set of the recommended predictor variables. For example, data could be collected using worker variables 5 (Q3:$\bar{X}$) and 8 (Q6A:%T). The calculation of means, the proportion of workers who check variable 8 (Q6A:%T), and the standard scores for each task on each variable could be accomplished easily on most computer facilities. The two standard scores for each task would next be summed together and the resulting single column would be re-standardized. The result is a ranking of the tasks by standard scores. This represents a dimension of training relevancy for development of task performance. Finally, using some externally determined task selection ratio, the number of desired tasks could be selected, say 50%.

To check this procedure, the eight predictor variable sets were used to derive eight different standardized score rankings, one for each predictor variable set, in the manner described above. This was accomplished for 180 tasks relevant to each occupation. Next, a similar procedure was used to standardize the CCQ, EEQ, and an average of the CCQ and EEQ for each occupation. Then, arbitrary selection cutoff points were used to select tasks. This included decisions to select (a) *80% of all tasks*, corresponding to all those tasks with a standard score of–0.84 and above, (b) *50% of all tasks*, corresponding to all tasks with a standard score of 0.0 and above, and (c) *20% of all tasks*, corresponding to a standard score of +0.84 and above.

Those tasks selected by the predictor variables and the criteria were scored by a 1 (one) and those not selected were scored by a 0 (zero). This permitted a 2 x 2 table to be calculated which indicated (a) the number of tasks which were *selected* by both the predictor and either the CCQ or the EEQ (or an average of both), (b) the number of tasks *rejected* by both, and (c) the number of tasks on which there was *disagreement*. Tables B-9, B-10, and B-11 present three examples of this type of summary, based on the equal weighting of variables 4 (Q13:$\bar{X}$) and 10 (Q7:%T), and the CCQ criterion.

Table B-9
80% Task Selection (Mechanics)

4. Q13:$\overline{X}$ / 10. Q 7:%T	CCQ:$\overline{X}$ Reject	CCQ:$\overline{X}$ Select	Totals
Reject	37 (21%)	8 (4%)	45 (25%)
Select	6 (3%)	129 (72%)	135 (75%)
Totals	43 (24%)	137 (76%)	180 (100%)

In this example 72% of the tasks were selected by both the predictor set and the CCQ. The phi coefficient for Table B-9 is .79 and is significant at $p < .01$.

Table B-10
80% Task Selection (Programmers)

4. Q13:$\overline{X}$ / 10. Q 7:%T	CCQ:$\overline{X}$ Reject	CCQ:$\overline{X}$ Select	Totals
Reject	21 (12%)	18 (10%)	39 (22%)
Select	17 (9%)	124 (69%)	141 (78%)
Totals	38 (21%)	142 (79%)	180 (100%)

In this example the phi coefficient is .42 and is significant at $p < .01$.

Table B-11
80% Task Selection (Secretaries)

4. Q13:$\overline{X}$ / 10. Q 7:%T	CCQ:$\overline{X}$ Reject	CCQ:$\overline{X}$ Select	Totals
Reject	19 (11%)	20 (11%)	39 (22%)
Select	20 (11%)	121 (67%)	141 (78%)
Totals	39 (22%)	141 (78%)	180 (100%)

In this example the phi coefficient is .34 and is significant at $p < .01$.

A total of 216 summary tables were calculated and all were significant at $p < .01$. The phi coefficients are not directly comparable to the multiple correlations previously calculated between predictor variables and criteria. The phi coefficients were calculated on 0 (zero), 1 (one) data, not raw or standard scores, and were partly a function of the 80%, 50%, and 20% task selection ratios. The multiple correlations indicate the positive relationship between the predictor variable and criteria, and the square of the multiple correlation indicates the amount of criterion variance that the predictor variables will account for. In all cases the phi coefficients are lower than the multiple correlations and this difference is larger for Programmer and Secretary data than for Mechanics. In the present context the multiple correlations between the predictor variables and the criteria are interpreted as the best indicators of the relationship between the predictors and criteria.

Summary. The regression analysis identified one set of worker variables, two sets of supervisor variables, and five sets of combined worker and supervisor variables, each of which significantly predicted the CCQ and EEQ (and the average of both) criteria for all three occupations. In addition, the simplest *standardized* beta weight ratios were identified for each set of predictor variables, and these standardized beta weight ratios are the same for all occupations. Therefore, any one of the eight predictor variables, using the presently derived standardized beta weight ratios, can be recommended for use in further research.

A task selection procedure was discussed which permits the derivation of a single standard score for each task, regardless of the number of predictors used. The calculation of standard scores for a set of tasks permits their ranking on a dimension of training relevancy for development of task performance. This was accomplished on the present tasks for each of the eight predictor variable sets and each criterion and for each occupation. An arbitrary selection ratio of 80%, 50%, and 20% was used to select tasks. A 2 x 2 predictor vs. criteria table was used to summarize the agreement between predictors and each criteria. In all 216 comparisons there was a significant phi coefficient between predictors and each criterion.

CCQ/EEQ ANALYSES

Interrater reliability. The interrater reliabilities based on the nine respondents for the CCQ and the nine respondents for the EEQ were calculated for each occupation. The results are presented in Table B-12.

Table B-12
Interrater Reliabilities, by Occupation and Questionnaire

Questionnaire	Mechanics	Programmers	Secretaries
CCQ	.83* (.88*)	.69* (.78*)	.80* (.83*)
EEQ	.78* (.82*)	.67* (.69*)	.73* (.76*)

Note. Coefficients in parenthesis represent interrater reliabilities adjusted for mean differences among raters.

*$p < .01$.

The reliabilities were calculated using an analysis of variance procedure suggested by Winer (1971, pp. 283-296). These interrater reliabilities are considered adequate. Reliability in the 80s and 90s are generally considered desirable (Anastasi, 1976, p. 109) even though the present reliability coefficients are significant at the $p < .01$ level. There is no doubt that the level of criteria reliability has contributed to the lower multiple correlations obtained, especially with respect to Programmer and Secretary data.

Magnusson (1967, p. 149 ff.) has offered a method by which the multiple correlation may be corrected for the reliability level of the criterion. For example, the relationship between any of the predictor variables and the true, or perfectly reliable, criterion is obtained by dividing the multiple correlation by the square root of the obtained criterion reliability. Hence, if the multiple correlation of .92 between variables 4 (Q13:$\bar{X}$) and 10 (Q7:%T) and the CCQ criterion (as reported in Table B-7 for Mechanics) is divided by the square root of the reliability of .83 (reported in Table B-12) for the Mechanics' CCQ, the result is a corrected multiple correlation of 1.00. Given that the reliabilities reported in Table B-12 are only adequate, and do negatively affect multiple correlations, then it may be advisable to consider corrected multiple correlations in addition to the empirically derived correlations in assessing the results of the regression analyses.

Category usage. Both the extent to which each interval on the CCQ and EEQ rating scale was used by respondents, and whether or not CCQ respondents used the scale differently, were determined by: (a) calculating the frequency with which respondents used each interval of the scale across all tasks, and by (b) subsequently calculating a chi-square statistic comparing the CCQ scale distribution to the EEQ scale distribution. The results are presented in Table B-13. The numbers within parenthesis represent the percentage of the row total.

Table B-13
Usage of Scale Categories

Questionnaire	Categories of Response Scale							
	0	1	2	3	4	5	6	7
Mechanics:								
CCQ	201 (12.4)	144 (8.9)	99 (6.1)	67 (4.1)	298 (18.4)	185 (11.4)	227 (14.0)	381 (23.5)
EEQ	161 (9.9)	114 (7.0)	50 (3.1)	61 (3.8)	612 (37.8)	210 (13.0)	196 (12.1)	196 (12.1)
Chi Square	196.8*							
Programmers:								
CCQ	311 (19.2)	185 (11.4)	70 (4.3)	105 (6.5)	339 (20.9)	118 (7.3)	164 (10.1)	263 (16.2)
EEQ	244 (15.1)	281 (17.3)	189 (11.7)	208 (12.8)	501 (30.9)	114 (7.2)	44 (2.7)	18 (1.1)
Chi Square	455.4*							

Continued

Table B-13 Continued

Questionnaire	Categories of Response Scale							
	0	1	2	3	4	5	6	7
Secretaries:								
CCQ	175 (10.8)	99 (6.1)	74 (4.6)	99 (6.1)	430 (26.5)	271 (16.7)	214 (13.2)	252 (15.6)
EEQ	151 (9.3)	160 (9.9)	115 (7.1)	84 (5.2)	629 (38.8)	220 (13.6)	127 (7.8)	127 (7.8)
Chi Square	132.4*							

*$p < .001$.

For all three occupations there was a significant relationship between questionnaire assignment (CCQ or EEQ) and scale interval usage. In general, CCQ respondents used the upper three intervals more often than did the EEQ respondents, while the EEQ respondents tended to use the middle intervals more often than did the CCQ respondents.

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DERIVED PREDICTION EQUATIONS

Prediction equations obtained for each set of TIQ variables in Table B 6 are listed below.

Using Variables 4 and 10:

$$\bar{y} = 1.80 + 1.00\ (Q13{:}\bar{X}) + .056\ (Q7{:}\%T)$$

Using Variables 4, 10, and 18:

$$\bar{y} = 1.57 + .63\ (Q13{:}\bar{X}) + .05\ (Q7{:}\%T) + .24\ (Q11{:}X)$$

Using Variables 5 and 6:

$$\bar{y} = 1.50 + .67\ (Q3{:}\bar{X}) + .03\ (Q6A{:}\%T)$$

Using Variables 5 and 10:

$$\bar{y} = 1.90 + .53\ (Q3{:}\bar{X}) + .05\ (Q7{:}\%T)$$

Using Variables 4, 8, and 17:

$$\bar{y} = 1.14 + .80\ (Q13{:}\bar{X}) + .03\ (Q6A{:}\%T) + .325\ (Q10{:}\bar{X})$$

Using Variables 5, 6, and 10:

$$\bar{y} = 1.64 + .46\ (Q3{:}\bar{X}) + .008\ (Q8{:}\%) + .05\ (Q7{:}\%T)$$

Using Variables 5, 6, and 8:

$$\bar{y} = 1.28 + .61\ (Q3{:}\bar{X}) + .007\ (Q8{:}\%) + .03\ (Q6A{:}\%T)$$

Using Variables 5, 8, and 19:

$$\bar{y} = 1.25 + .48\ (Q3{:}\bar{X}) + .03\ (Q6A{:}\%T) + .19\ (Q8{:}\bar{X})$$

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Complementing the focus on the task performance content of jobs is the methodology for surveying work related technical concepts which have practical use to workers in the effective performance of their job. Concept inventory procedures are described and a descriptive report of job significance ratings is given for concepts in the occupations of automotive mechanics, business data programmers, and general secretaries.

Rating the Job Significance of Technical Concepts: An Application to Three Occupations (R&D Series No. 105), December 1974.

Exploratory ways of identifying that work-relevant affect by which workers in an occupation approach their job, their coworkers, and the entire work environment. Procedures are suggested, and initial tryout results are reported, for a promising approach to the identification of those non-technical aspects of the job which contribute to worker satisfaction and success. A companion report is provided for processing the associated worker data.

A Methodology to Assess the Content and Structure of Affective and Descriptive Meanings Associated with the Work Environment (R&D Series No. 98), December 1974.

RCMAT: A Computer Program to Calculate a Measure of Associative Verbal Relatedness (Occasional Paper No. 6), 1975.

OCCUPATIONAL SURVEY REPORTS

Providing field data for establishing the methodology of the five volume *Performance Content for Job Training* are

Three reports of task surveys conducted for specific occupations. These 1974 surveys were obtained from numerous communities in eight states distributed across the nation. Both workers and immediate supervisors, 200 per occupation, provided task data on an array of experimental questions pertaining to (a) task occurrence, (b) frequency of task performance, (c) task significance to the job, (d) time on job before task qualification is expected, (e) task importance to the job, (f) suggestions of performance problem areas, and (g) primary learning locations for each task.

Occupational Survey Report on Business Data Programmers: Task Data from Workers and Supervisors Indicating Job Relevance and Training Criticalness (R&D Series No. 108), December 1974.

Occupational Survey Report on General Secretaries: Task Data from Workers and Supervisors Indicating Job Relevance and Training Criticalness (R&D Series No. 109), January 1975.

Occupational Survey Report on Automotive Mechanics: Task Data from Workers and Supervisors Indicating Job Relevance and Training Criticalness (R&D Series No. 110), January 1975.

A 1971 survey of workers in one metropolitan area was conducted for entire occupational areas incorporating several specific occupations. Field data were obtained on (a) task occurrence and (b) relative proportion of time spent on each task. The survey reports include comparisons between related occupations, and generate the initial listing of tasks used in subsequent studies of specific occupations within each occupational field.

Automotive Mechanics Occupational Performance Survey (R&D Series No. 86), March 1973.

Secretarial Science Occupational Performance Survey (R&D Series No. 87), March 1973.

Business Data Processing Occupational Performance Survey (R&D Series No. 88), March 1973.

SURVEY OF CURRICULUM DEVELOPERS

Providing information on the activities and needs of curriculum developers is the 1974 survey of more than 300 persons in education and training, both public and private, throughout the nation. The survey analysis emphasizes the responses of curriculum developers concerned with vocational education to the list of 68 work activities, but includes other areas of public education, business/industry, and government agencies. Responses were given to activity questions pertaining to (a) occurrence of the activity, (b) degree of problem encountered in performing each activity, and (c) activity importance to the job.

Activities, Problems, and Needs of Curriculum Developers: A National Survey (R&D Series No. 115), May 1976.

TASK INVENTORY EXCHANGE

To promote the sharing and general availability of task inventories and of occupational surveys, a central clearinghouse is conducted for the collection and dissemination of materials prepared by agencies in education, labor, agriculture, industry, business, government, the professions, and various special interest groups. Three volumes of a directory of over 800 available task inventories so far have been published. Additionally, a symposium on methodologies was sponsored at which 15 presentations were made to an audience of 158 persons from 26 states, sharing their experiences, problems, solutions, and thinking on various aspects of the issue.

Directory of Task Inventories: Volume 1, 1974 (UN Series No. 6), January 1975.

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